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MOSQUITO CONTROL 1976

MUNICIPAL ABATEMENT PROGRAMS

SB
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1976

Ontario
Ministry of the Environment

The Honourable
George A. Kerr, Q.C.,
Minister

K.H. Sharpe,
Deputy Minister

Ref 20866

MOSQUITO CONTROL

MUNICIPAL ABATEMENT

PROGRAMS: 1976

HAZARDOUS CONTAMINANTS
COORDINATION BRANCH
135 ST. CLAIR AVENUE WEST
TORONTO, ONTARIO M4V 1P5

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D. L. MacKenzie

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ABSTRACT

Reduction of biting incidence by nuisance mosquito populations has been found to be possible through many techniques: breeding site eradication or habitat alteration (improvement of land drainage, filling of depression areas found to be larvae habitats and vegetation clearances around buildings where adults may rest); personal protection measures and pesticide application (larviciding, adulticiding or a combination of both). This report documents the mosquito control activities undertaken by a number of towns, cities, boroughs, townships, counties and regional municipalities in southwestern Ontario during 1976. Each municipality modified and adapted a programme to suit local conditions following procedures previously outlined in reports by the Ministry of the Environment for 1974 and 1975. It is hoped that this information will be useful to other municipalities wishing to initiate a local mosquito abatement programme and those muncipalities with existing programmes who wish to compare, modify or improve techniques.

INTRODUCTION

In Ontario, mosquitoes continue to be a source of discomfort to many residents during the spring and summer months. Demand for control of these pests has increased public awareness of the complexity of this problem and the various methods available for control. It is important to note that control does not mean elimination or eradication. However, it is possible to reduce mosquito populations to acceptable levels having considered such variables as species of mosquitoes present, available breeding habitat within and adjacent to the proposed area of control, physiography of the area and annual climatic conditions.

A report entitled "Mosquito Control, Orillia 1974", by the Ontario Ministry of the Environment, Pesticides Control Section documents the approach taken by one municipality to control the spring Aedes spp. mosquito population in 1974. This report will continue to be used as a general reference for which a second report of 1975 activities was a follow-up. As is apparent in the latter report, other municipalities had to diverge in their approach from the 1974 Orillia programme because of different requirements. This 1976 report is thus the third in a series of annual reports on municipal mosquito control activities in the province. As information is gathered on how programmes can and should be modified to meet local conditions, a general guideline on mosquito control may be published.

In the interim, the following should be considered with these reports in the preparation and execution of an effective mosquito abatement programme:

1) Fact Sheet: Guidelines for Municipal Mosquito Abatement Programmes (enclosed).,

2) Controlling Mosquitoes and Black Flies in Ontario, 1977 (enclosed).

A licence and permit as required for mosquito control in Ontario under The Pesticides Act, 1973 and Regulations does not relieve an individual of the responsibility of improper use of a pesticide but seeks to minimize the risk of errors which might make pesticide use hazardous to human life or to the environment.

MOSQUITOES AS A HEALTH HAZARD, FALL 1975

Mosquito-borne encephalitis was first suspected in southwestern Ontario on September 12th, 1975 in Windsor. Confirmation of human cases of St. Louis encephalitis was made by Dr. L. Spence of the National Arbovirus Reference Centre, Banting Institute, University of Toronto on September 16th. An emergency meeting of representatives of the Ministries of Environment and Health, the Provincial Entomologist, university researchers, officials from the City of Windsor, Essex County, and the local Health Unit and representatives from the pesticide industry was held in Windsor on Saturday, September 20th, where lengthy discussions took place on all possible courses of action. At this time there were 63 suspected cases of St. Louis encephalitis in the Windsor area and no guarantee that further cases would not continue to occur until first frost, possibly 30 days hence.

Since it was imperative that circulation of the disease be stopped, it was determined that an aerial adulticiding programme was the only method of control able to fully ensure elimination of the current adult mosquito population carrying the disease. Mosquitoes likely to emerge from larvae would not transmit the infection. Based on considerations of immediacy of action, size of territory to be sprayed, rapid execution of the programme (to kill all mosquitoes in a short period of time when they were actively flying), accuracy of application (to minimize flight overlaps) and uniformity of application (to reduce possible spray spotting of cars and vegetation),

materials and equipment available, experience of pilots and through recommendations of persons present who were familiar with action that had been required in similar outbreaks elsehwere, a decision was made to use a DC-6 plane from Con-Air Aviation Limited, Abatsford, British Columbia, and an ultra-low volume application of Baygon (propoxur) over approximately 114,000 acres (which included the City of Windsor and a three mile buffer zone). The actual spraying was completed within a four hour period on the evening of September 27th, utilizing 1½ plane loads. Assembly of equipment and materials was completed by September 23rd but inclement weather prohibited any spraying before Saturday, September 26th. The treatment rate was 4.5 fluid ounces of Baygon OSC concentrate mixed with 1.5 fluid ounces #2 fuel oil for a total of 4 fluid ounces mix per acre. This was equivalent to 0.75 ounces (0.047 lbs.) of propoxur (active ingredient) per acre. A total of 3,013 gallons of Baygon was used over 97,824 acres.

Personnel from the mosquito abatement programme of the City of Edmonton monitored the spray operations with the help of industry and Ministry personnel; they also assisted in identification of mosquito species present. The Chemical Control Research Institute of Environment Canada ground-monitored the pesticide spray pattern. Follow-up was made on impact on vegetation, (temporary spotting of some turnips, mustard and broccoli greens occurred), and car spotting claims (2) by staff of the provincial Agriculture and Environment Ministries and the local Health Unit. Local residents reported excellent adult mosquito control for a two day period immediately following the aerial programme. No further human cases of St. Louis encephalitis occurred that fall although additional cases were confirmed in retrospect from places in addition to Essex County.

MOSQUITO CONTROL IN ONTARIO 1976

As a result of 67 cases of St. Louis encephalitis appearing in southwestern Ontario in the fall of 1975 (Windsor-Essex-51, Niagara Region-6, Sarnia-Lambton-4, Toronto-2, Hamilton Wentworth-2, Chatham-Kent-1, North York-1) and the five deaths confirmed from this arbovirus, the Ministry of Health designated the area south of a line between Sarnia and Toronto as the area of highest risk for reoccurence of St. Louis encephalitis in 1976. Since there is no vaccine for this virus and mosquitoes are the vector responsible for transmission of the virus from birds to humans, all municipalities within this territory were strongly urged to implement mosquito abatement programmes.

Mosquito control was not implemented to prevent encephalitis, but was one method of approach which would reduce the chances of a possible epidemic. Municipalities were encouraged to use larvicides selectively wherever breeding sites of summer mosquitoes were identified. The purpose of this approach was threefold:

(a) Reduction of the mosquito population responsible for amplifying viremia in the bird population;

(b) Reduction of the mosquito population responsible for transmitting the virus from the birds to humans;

(c) Reduction of the nuisance mosquito population which was biting man. This was to allay public fears of contacting encephalitis, a real concern following the 1975 Windsor experience.

Thus the programmes were not designed to control only one species of mosquito, Culex pipiens, frequently reported by the media as the one and only culprit. Lack of exact scientific data on this disease in Ontario could not allow us to ignore other mosquito species as possible suspects.

Most of mosquito control activity prior to 1975 in southwestern Ontario involved sporadic localized use of adulticides in urban areas such as London. In 1975, London and Wallaceburg developed and executed control programmes which placed emphasis on larvae control with a back-up of adulticiding where levels of adult populations warranted this measure. It is very important to stress that control of mosquitoes while in the larval stage, when their distribution is confined to limited water areas, is easier and much more effective than trying to kill mosquito adults which are very mobile and can often fly great distances. The Pesticides Control Section, therefore, had to provide training and instruction on programme development and implementation for all other interested municipalities, early in 1976. Four texts were used as the basis of information:

1. Controlling Mosquitoes and Black Flies in Ontario 1976
2. Mosquito Control, Orillia 1974
3. Mosquito Control, Orillia 1975
   Mara Township
   London
   Wallaceburg
4. Guidelines for Municipal Abatement Programmes

The latter fact sheet outlined the policy and procedures for planning a comprehensive municipal programme. Before pesticides are purchased and applied, all breeding sources must be located and recorded and monitored continually for evidence of mosquito larvae. Information on breeding sites with description should be mapped and recorded in reference to a grid plan so that field crews can easily locate these sites for treatment and post-treatment checks. Habitat descriptions such as temporary or permanent water, woodland or grassy pool type can assist crews familiar with mosquito biology on determining the time and frequency that the site should be checked for larvae since

certain genera of mosquitoes will utilize only certain types of water habitat.

Before larvicides can be used in a municipality, two types of pesticide licences are required as specified under The Pesticides Act,1973 and Regulations. The first is an operator's licence which ensure that the municipality carries adequate insurance coverage to cover all types of liability: personal protection, public liability and property damage. With an operator's licence, the municipality may then have a number of staff holding exterminator's licences. This second type of licence recognizes that the holder has sufficient technical knowledge to handle and use a pesticide correctly and safely in the execution of a control activity. Examinations are held either oral or written or both to measure completence of a candidate.

Through April, May and June of 1976, the Pesticides Control Section held 11 examination sessions in various centres in south and southwestern Ontario. A day prior to the examination, tutorial sessions were held to brief candidates on topics covered in study material: mosquito biology and possible methods of control. The Pesticides Act, 1973 and Regulations, pesticide toxicology, equipment calibration, application techniques and control programme evaluation. Over 200 personnel were licensed as exterminators by mid-June representing over 60 towns, cities, boroughs, townships, counties, regional municipalities, Commissions, provincial ministries and federal government agencies within the high risk area.

Under The Pesticides Act, 1973 and Regulations, any treatment

of water directly with a pesticide must be authorized by a permit. Permits were granted to municipalities who, through their application, indicated that they had surveilled and mapped the possible breeding sites within their area and were prepared to treat only those sites where larvae were found. The Ministry qualified approval by requiring that detailed records be kept of where larvicides were used and when, the quantity and how it was applied, and costs of both pesticide and labour. These summaries have been prepared and have been included as part of the text of this report.

Timing of a larvicide treatment is very important as its action against mosquito larvae will be effective only at certain growth stages of the mosquito and the larvicides are generally very short in residual action. To know how frequently a potential breeding site would have to be checked and possibly treated for mosquito control, it was of benefit to know what species of mosquitoes developed in those different sites. The Ministry arranged for samples of larvae to be collected from typical sites within the municipalities to be identified by one of a number of entomologists contracted by the Ministry on a part-time basis in 1976 expressly for this purpose. Figure 1 lists the entomologists involved and the territory to which they were assigned. Since background data on mosquito species distribution and density was not available, this information helped the municipality organize their workload in terms of which sites were producing which genus of mosquito (i.e., Culex sp.) and also how often these areas would have to be monitored and possibly treated.

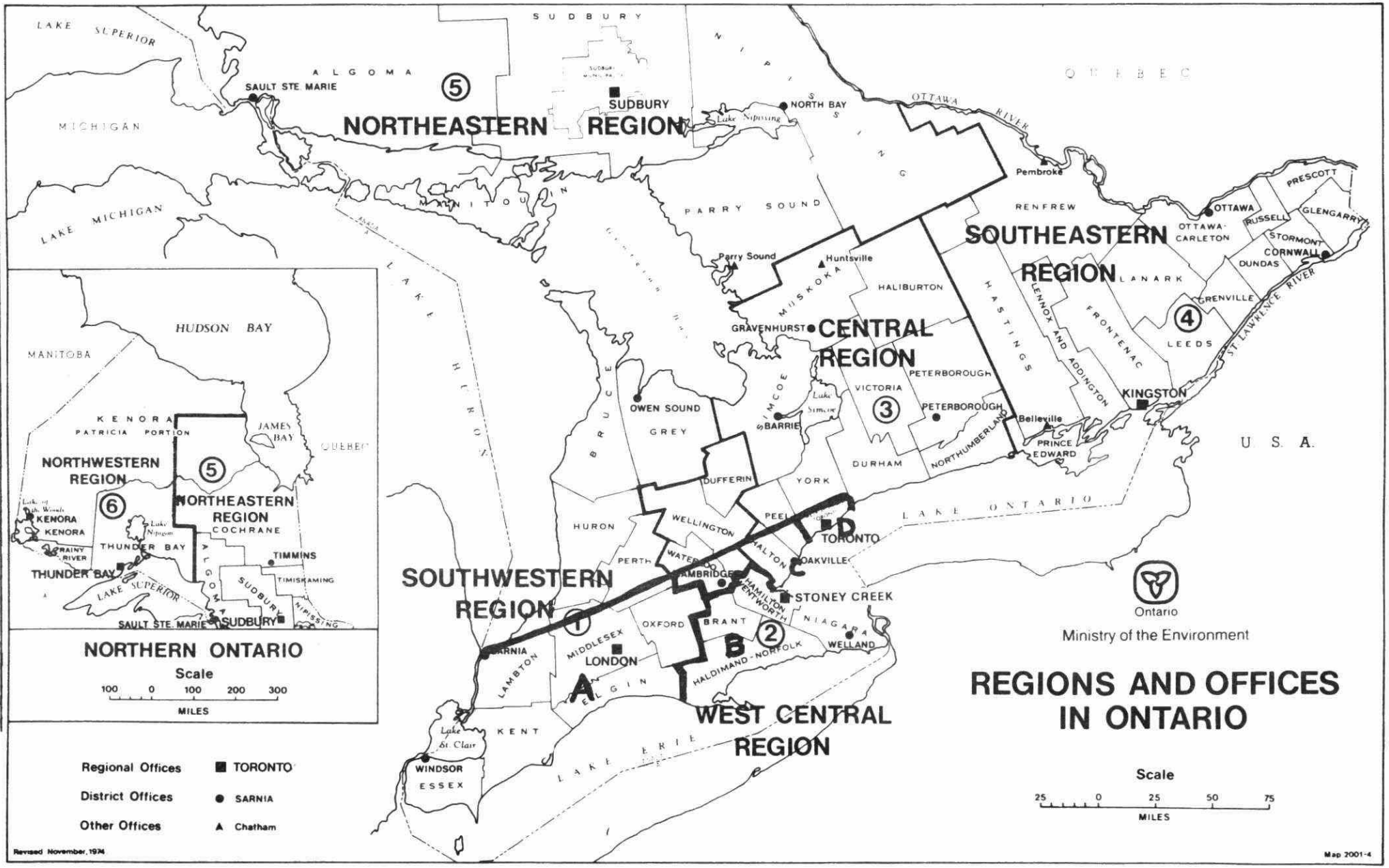
Table 1

1976 Mosquito Identification

MOE Contract Entomologists		Area of Responsibility
W. C. Allan (Scotty) 105 Grange Street Guelph, Ontario N1G 1H7	519-822-1657 (Home)	C, A
Dr. Gordon Dustan 428 Victoria Avenue Box 252 Vineland Station, Ontario LOR 2EO	416-562-4835	B
Harold Goble 51 Forest Street Guelph, Ontario N1G 1H7	519-822-1657 (Home) 519-824-4120 Ext. 2700 (Office)	D
W. E. Heming 67 James Street West Guelph, Ontario	519-824-3445	C, D
Harry B. Wressell 114 Park Avenue West Chatham, Ontario N7M 1V9	519-354-2603	A

Figure 1

Regions Established for Mosquito Identification



The decision of when to treat an identified breeding site was made at the local level. Some municipalities treated pools whenever larvae were found and some only when a specific number of larvae (5, 10, 15 or 20) per dip were counted. Mosquito larvae can be very irregular in their distribution within a breeding pool and can respond quickly to shadows and water disturbances - diving out of reach and detection by inexperienced surveyers. Therefore, standardizing the density of mosquito larvae with dipping counts is extremely difficult under most circumstances. Since many programmes were new in 1976, and obviously some breeding sites remained undetected, licensed staff were encouraged to treat any breeding sites found to contain larvae.

Generally, usage of larvicides by the municipalities was very much lower than was originally anticipated, since very few of the possible breeding sites actually proved to be producing mosquitoes. Not all areas in southwestern Ontario adopted the same degree of involvement in a comprehensive programme and so it is difficult to generalize. However, one example of a programme is included here for illustration. Summaries of all 1976 municipal programmes may be found at the back of this text.

The Regional Municipality of Halton appointed a mosquito co-ordinator to organize mosquito abatement with representatives of the Halton Region Conservation Authority, Region of Halton, City of Burlington and the Towns of Oakville, Milton and Halton Hills. Each of these areas undertook their own control programme with their own licensed personnel. Complaints and local problems were referred to the Ministry only if the co-ordinator was unable to take local action.

Thus, after a great deal of initial contact with Ministry personnel in the preparation and planning of a programme, the programme was run at the local level. The following details were provided to the Ministry:

	Halton Region Conservation Authority	Town of Oakville	Town of Milton	City of Burlington	Region of Halton	Town of Halton Hills
Area sprayed (acres)	0.88	2.88	7	8	3	7
Larvicide (used quantity - lbs.)	3	8.5	20	25	15	30
Labour (manhours)	110	2,600	880	600	1,100	290
(cost)	$558.95	$10,000	$2,640	$2,400	$4,400	$1,137.56
Equipment	$218.00	$1,400	?	$700	$218.28	$377.92
Total Cost	$868.23	$11,400	$3,940	$4,000	$6,107.11	$1,896.48

Miscellaneous costs such as vehicle rentals and depreciation, car mileage, licence fees have not been included.

It is extremely encouraging for a municipality this size to feel that they had an effective programme and it was accomplished with the use of approximately 100 pounds of 2% larvicide. The Ministry of the Environment received no complaints about the programme and also feels that it was successful.

Any evaluation of the effectiveness of an abatement programme had to be made at the local working level through such indicators as public complaints and post-treatment mosquito larvae mortality checks. Where access to private property for larvae surveillance and/or treatment was not possible, general effectiveness of the whole programme was reduced.

For most of the municipalities using larvicides in 1976, the majority of them used temephos or Abate, either granular or liquid formulation, as the basis of their programmes. This pesticide had already been used with success in 1974 and 1975 in the province and is one of the least persistent larvicides so registered. Since there was public concern with overdose and excessive use of pesticides by inexperienced personnel, residues of Abate were again monitored by both Ministry of Environment and university researchers. In addition, where other larvicides such as chlorpyrifos (Dursban) were used, the Pesticides Control Section monitored use.

Temephos or Abate applied at the recommended registered rate either as a 2% granular at the rate of 2.5 - 5 pounds product per surface acre of water or as a 43% emulsifiable concentrate at the rate of 0.5 - 1.5 fluid ounces product per acre does not persist at concentrations greater than 1 ppb (parts per billion) in pools longer than two to three days.

There are a number of factors which affect the initial concentration of pesticide residue and subsequent rate of dissipation:

1. Type of Formulation

An emulsifiable concentrate sprayed on the water surface will exhibit highest concentrations immediately after treatment, before any of the mechanisms of breakdown are operant and the liquid is not diluted by flooding. In comparing residue data of liquid and granular formulations, the Pesticides Control Section has found an initial post-treatment level of temephos when used as a liquid formulation (London 1976) to be slightly higher than a comparable level from use of granular (Orillia and Wallaceburg 1975): 16 ppb vs. 11- 13 ppb. However, this difference is not statistically significant.

The liquid formulation gets quickly absorbed into organic matter (live and dead) in the water and rapidly broken down, and thus it disappears relatively rapidly from the system: 16 ppb → < 1 ppb in 24 hours (London 1976).

Some temephos in a liquid application may become tied up in the sediment element but levels thus far have been below limits of detection (< .1 ppm).

Abate in the graular formulation, however, must first be released from clay granules onto which it has been formulated and so there is a slight delay in peak residue levels found in water. As most of it becomes tied up on organic litter in the bottom sediment, residues have been detected on the pool bottom, generally in the 1.0 - 0.1 ppm maximum range. Readings above this have occurred where a large number of viable granules have been captured in the sediment sample immediately after treatment (Orillia 1975). Levels have dropped to non-detectable levels (< .1 ppm) within 24 hours in all monitoring programmes done by the Ministry in 1974 - 1976.

2. Method of Application

There is always a margin of error involved in pesticide application where equipment must be calibrated to disperse a certain quantity of material per unit area. In this context, human experience with the equipment used will have a devinite influence on maximum larvicide concentrations found in treated mosquito breeding pools. In Ontario, temephose has been applied aerially (granules from a helicopter) and with ground equipment (hand cranked granular seeders, granular power blowers, portable hand-pumped backpack sprayers and liquid power sprayers). There is insufficient data at this time

to suggest that any one method of application is any more or less effective or environmentally safe than another. Some field crews are more comfortable using granular formulations from hand-cranked seeders because the display pattern produced is a simple guide to application of the correct rate of larvicide. (It must be remembered, however, that the larvicide may also be on dust emitted from granular applicators and, as such, can enter the pool as an invisible component in addition to the visible granules). But, as exterminators become more familiar with techniques and more confident in their own ability to use larvicides effectively, digression can be made to more sophisticated equipment.

3. Pool Characteristics

Mosquito breeding pools do not come in convenient sizes and shapes. (Nor do all mosquitoes spread themselves uniformly over a pool area). Such parameters as irregularity of shape, depth and placement of vegetation, type and density of bottom litter will interrupt even dispersal of any pesticide applied to the water. Thus, although a liquid or granular larvicide may be applied uniformly to the surface of the water, the resulting concentration in the water column and sediment may fluctuate as much as an order of magnitude locally.

Rate of disappearance of an organophosphate larvicide from the water is influenced both by the amount of organic matter in the water and water temperature. The higher either of these factors are, the more rapidly the larvicide will be reduced to non-detectable levels (personal communication, City of Toronto 1976).

In addition, water temperature may have a biological effect. If the water is very cold, the metabolic rate of mosquito larvae is slowed down and the rate of feeding under these conditions may be so slow that not a sufficient quantity of toxicant is consumed by the larvae to cause mortality (personal communication, Windsor 1976).

In 1976, the Pesticides Control Section also monitored use of a relatively more persistent organophosphorous larvicide, chlorpyrifos (Dursban), which is registered both as a 2½% granular material and an emulsifiable concentrate. This was the first opportunity the Ministry had to evaluate this material under actual field use conditions. All the factors previously discussed on use and persistence of temephos also apply to chlorpyrifos, with variations only in maximum residue concentrations found to be necessary to produce larval mortality within 24 hours (25 - 35 ppb ¼ - 1 hour immediately post-treatment) and rate of pesticide degredation (35 ppb → <.01 ppb from water in 8 days) (Sarnia, August 1976). Since this pesticide is relatively more persistent than temephos, there are obvious advantages and disadvantages. Since it is very persistent in the environment, it can not be used (see label) more frequently than two weeks to treat the same area. It is more toxic to aquatic biota and, therefore, cannot be used to treat open water, wildlife and fishery areas (i.e. marshland) where there may be more of a possibility of a negative environmental impact. Chlorpyrifos can be used to advantage, however, where stagnant, highly organic water such as landfill sites is producing a continual batch of Culex species and all age categories may be found in the same breeding site. Using a more persistent material will reduce the

frequency with which these types of sites must be treated to maintain mosquito control. Figure 2 may be useful when considering the selection of pesticides to use.

In summary, in the mosquito control programmes conducted in Ontaric in 1976, larvicides were applied selectively to water areas only where mosquito larvae were detected in sufficient quantities to warrant treatment. Records of activities this year indicate very little larvicide was actually used. Much of the pesticide purchased in anticipated use over 1976 still remains in municipal storage.

Some municipalities conducted mosquito surveillance programmes only to find out where different species of insects were breeding but made no larvicide treatments. In other municipalities, a minimal amount of adulticiding only was undertaken as conditions warranted.

Where larvicides were used, larval mortality was monitored 24 to 28 hours post-treatment to determine the effectiveness of a treatment. Reports from municipal mosquito control programme co-ordinators in 1976 have supported the previous year's findings of the Ministry that a satisfactory level of mosquito control can be achieved, through a minimal use of pesticides. This is especially true when a campaign also includes: (a) source reduction through filling or draining of standing water that can be potential mosquito breeding sites and, (b) public education on mosquito biology and personal protection measures.

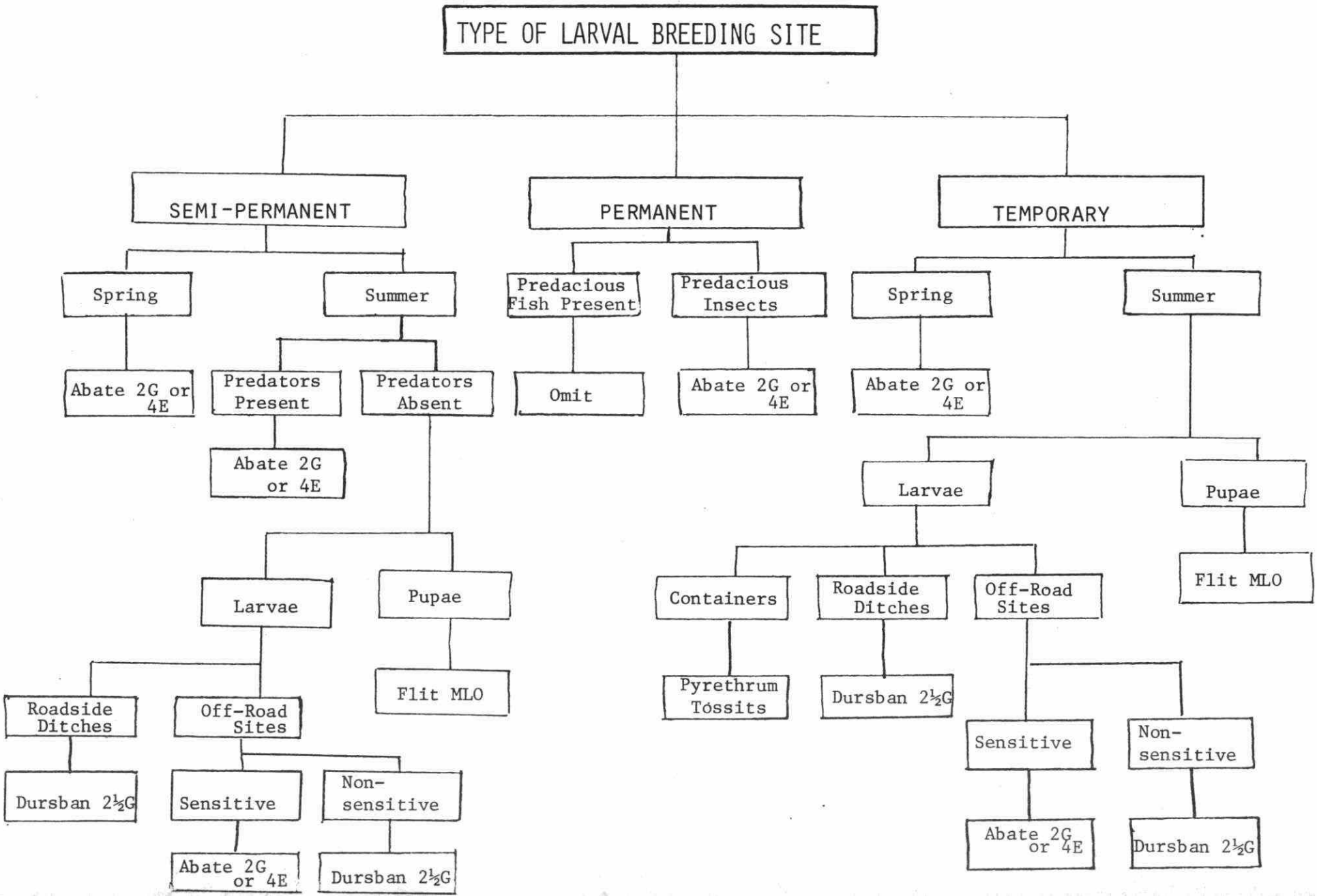

TYPE OF LARVAL BREEDING SITE
SEMI-PERMANENT
PERMANENT
TEMPORARY
Spring
Summer
Predacious Fish Present
Predacious Insects
Spring
Summer
Abate 2G or 4E
Predators Present
Predators Absent
Omit
Abate 2G or 4E
Abate 2G or 4E
Abate 2G or 4E
Larvae
Pupae
Larvae
Pupae
Roadside Ditches
Off-Road Sites
Flit MLO
Containers
Roadside Ditches
Off-Road Sites
Flit MLO
Dursban 2½G
Sensitive
Non-sensitive
Pyrethrum Tossits
Dursban 2½G
Sensitive
Non-sensitive
Abate 2G or 4E
Dursban 2½G
Abate 2G or 4E
Dursban 2½G

Figure 2

Four human cases of St. Louis encephalitis were confirmed in southwestern Ontario in 1976: Amherstburg, Dresden, Tecumseh and Windsor. Onset of the disease occurred between August 6th and September 3rd. This evidence of continued circulation of St. Louis encephalitis virus in southwestern Ontario supports continued activity of mosquito control by all methods at one's disposal to minimize the possibility of health hazards associated with this insect.

SURVEILLANCE FOR ST. LOUIS ENCEPHALITIS, 1976

In response to the outbreak of SLE in 1975 the Ontario Ministry of Health embarked on a monitoring programme for SLE virus in humans, wild and domestic birds, and potential mosquito vectors. Personnel from the University of Guelph, Department of Environmental Biology under Dr. G. Surgeoner and Dr. B. Helson, monitored SLE activity in sentinel chickens and mosquito populations. The sentinel system was designed to:

1. Determine the dominant mosquito species in southwestern Ontario, their seasonal distribution and relative population levels. This information will serve as a basis for future population comparisons.
2. To collect, identify and pool mosquito species for viral analysis to establish those species of mosquitoes involved in transmission of SLE among the bird population and to man.
3. Monitor the cycling of SLE in the bird population of southwestern Ontario by the use of sentinel chicken flocks maintained in areas of high bird activity and high mosquito populations.
4. Based on the degree of viral activity in the sentinel chicken flocks and mosquitoes collected from these sites, predict the potential for virus transmission to humans and establish the need for additional control measures.
5. While monitoring for SLE determine other viruses being carried by mosquitoes in southwestern Ontario.

Methods

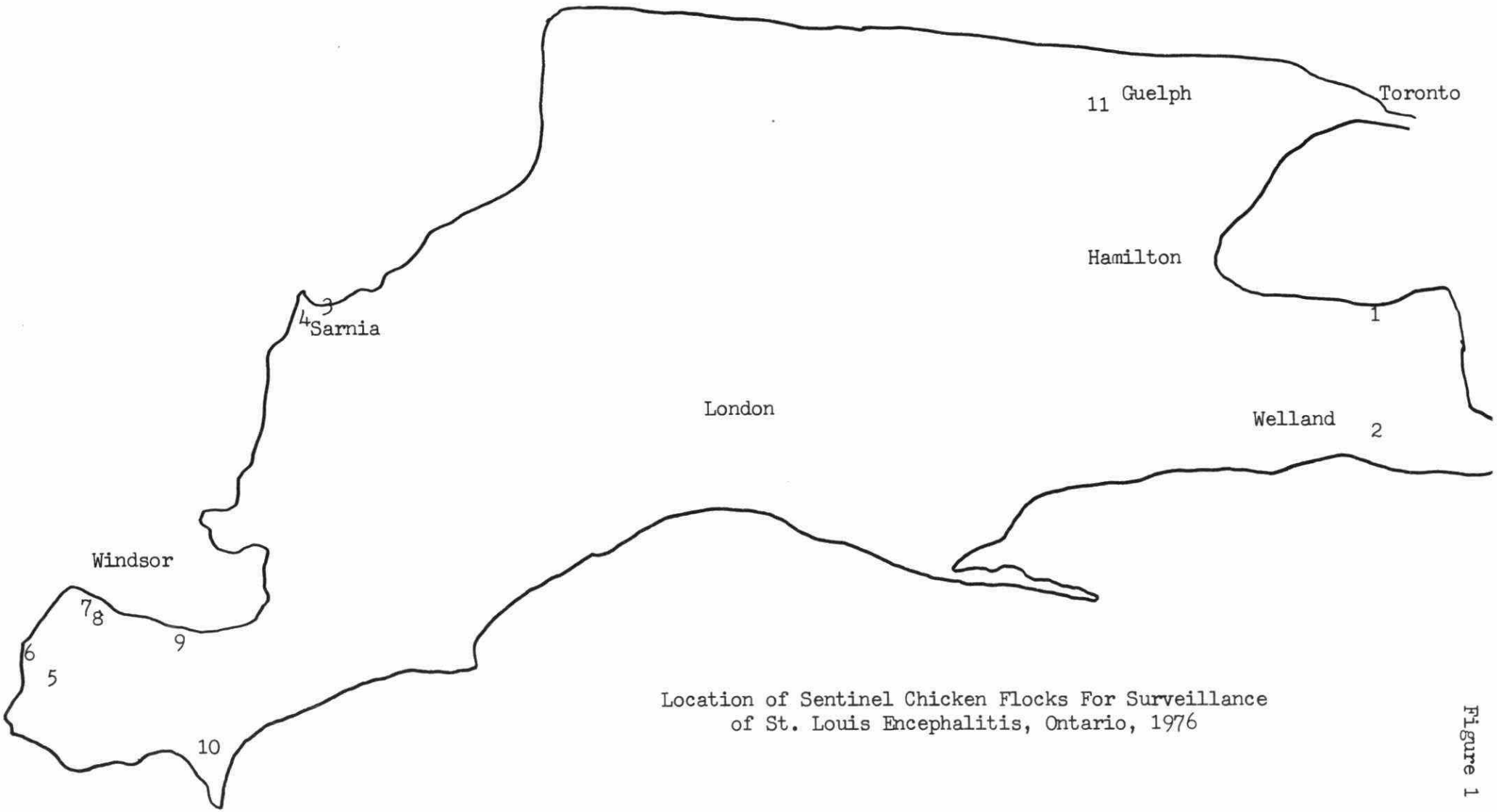
In May of 1976, eleven permanent collecting sites were established at various locations throughout southwestern Ontario (Fig. 1). Six of these sites were located in Essex County where

76% of the 1975 confirmed cases were reported; other sites included Sarnia (2), Welland (1), St. Catharines (1), Guelph (1). At each site 10 chickens less than 3 months of age were maintained. Individual sites were selected on the basis of previous viral isolations and potential high levels of mosquito activity. Adult mosquito collections, at each site, were made using two trapping techniques: a CDC light trap baited with dry ice, suspended from the chicken coop and a cone trap baited with dry ice placed within 30m of the chicken coop.

Surveillance was begun May 15, 1976 and continued through October 1, 1976. Each week blood samples were taken from 5 chickens at each site, either by direct heart puncture or veing puncture in the wings. With the first confirmed case of SLE in 1976, all chickens were bled at each site from ca. August 27 to September 10. Blood samples were recorded as to site and bird number, chilled at 10^{o}C and shipped to the University of Guelph.

All chicken sera were examined by Dr. J. Thorsen, Ontario Veterinary College, by the Haemaglutination - inhibition test for presence of antibodies of SLE, EEE, WEE or California group antibodies. Any positive identification of SLE antibodies was confirmed by the National Arbovirus Reverence Service, Toronto, Ontario.

At each site, CDC traps and CO_2 Baited cone traps were operated for one evening a week. The traps were operated overnight and mosquitoes collected the following morning. These were anaesthetized with CO_2, transferred to metal cannisters and shipped live to the University of Guelph. These were then immobilized using dry ice, counted and identified. Pools of



Location of Sentinel Chicken Flocks For Surveillance
of St. Louis Encephalitis, Ontario, 1976

Figure 1

individual species (50 females per pool, less if necessary) were formed and stored at -70°C until tested for viral activity.

Mosquito larvae and pupae in the vicinity of sentinel flocks were collected each week. These were identified and their stage of development recorded. In addition, trapping of mosquitoes by University personnel, and wild birds by Dr. Dorland, Ontario Ministry of Health, were made in close vicinity to human residences of confirmed SLE cases in 1976.

Most of the viral activity to date has been isolated from Culex mosquitoes particularly C. Pipiens. It should, however, be emphasized that a majority of the pools tested to date have been from Culex pipiens mosquitoes.

Table 2. Viral isolations from southwestern Ontario 1976.

Site	Viral Identification	Species of Mosquitoes	Date
Windsor Site 9	Flanders	Culex pipiens	July 12
	*2 California	Aedes trivittatus	July 25
	2 Flanders	Culex pipiens	July 25
	2 Flanders	Culex pipiens	Aug. 2
	1 Unknown	Culex pipiens	Aug. 2
	*1 California	Aedes trivittatus	Aug. 9
	2 Flanders	Culex sp.	Aug. 9
	2 Flanders	Culex pipiens	Aug. 15
Windsor Site 8	1 Flanders	Culex pipiens	Aug. 2
Windsor Site 7	2 Flanders	Culex pipiens	July 19
Windsor Site 6	1 Flanders	Culex pipiens	July 20
	1 Flanders	Culex pipiens	July 27
	*1 California	Culex pipiens	Aug. 3
Windsor Site 5	1 Flanders	Culex pipiens	July 20
	1 Flanders	Culex pipiens	July 25
	1 Unknown	Aedes vexans	July 25
	* 1 SLE	Culex sp.	Aug. 10
Chatham	1 Unknown	Aedes vexans	July 25
London	1 Flanders	Aedes triseriatus	Sept. 9
Amherstburg	1 Flanders	Culex pipiens	Aug. 31

* Confirmed arboviruses

As of May 1/77 18 more suspected mosquito pools are being examined, 5 of which are Flanders.

Table 1

Total number of mosquitoes by species collected at each site, number of pools made are beneath each total.

	Aedes vexans	Ae. triviattatus	Ae. stimulans	Ae. fitchii	Ae. canadensis	Ae. intrudans	Ae. dorsalis	Ae cinereus	Aedes species	Psoroplora species	Mansonia perturbans	Anopheles walkeri	An. Punctipennis	Anopheles species	Culex pipiens	Culex restuans	Culex species	Culiseta morsitans	Culiseta inornata	Culiseta species
# 1	151	3	6					2			2,339	1	4		31		204			
	5	-	-					-			50	-	-		2		5			
# 2	1,657	27	60	13	15	3		39	42		59	4	30		289	38	567			
	34	2	1	-	-	-		2	1		2	-	1		10	1	14			
# 3	1,712	2	18				103				228	2	13	1	872	55	146			
	40	-	1				2				7	-	-	-	20	2	5			
# 4	2,970	3	40	32		1	2,012	6		1	568	22	19		601	10	3			
	61	-	2	1		-	44	-		-	15	-	1		15	-	-			
# 5	1,176		1		2		8	2	9		14	5	38		515	5	114			
	27		-		-		-	-	-		-	-	2		14	-	3			
# 6	3,718	7	167	11	115	2	5	8	18		81	1	52	2	3,502	72	548		1	
	67	-	4	-	1	-	-	-	-		1	-	1	-	70	2	11		-	
# 7	1,179	1					9	1	5		1,332	4	9		1,612	112	554	1		
	28	-					-	-	-		28	-	-		35	3	14	-		
# 8	4,114	173	70	18	66	3		3	31		2,234	31	30	2	658	51	55			
	78	4	1	1	1	-		-	-		40	1	-	-	18	3	3			
# 9	1,845	408	34		1	1		2	8	2	1,641	1	103	1	1,088	125	1,072			
	40	19	1		-	-		-	-	-	28	-	6	-	26	4	22			
#10	98		2		1		10	3			55,844	924	29		37	4	29		1	
	3		-		-		-	-			129	23	1		3	1	2		-	
#11	283	4	602	32	130	12		63	17		60	195	6		8	9	8	2		
	9	-	15	1	4	-		2	1		2	7	-		1	-	-	-		
Total mosquitoes	18,903	1,128	1,000	106	328	22	2,147	129	130	3	64,421	1,190	333	6	9,214	481	3,300	3	2	
Total Pools	392	25	25	3	6	-	46	4	2	-	302	31	12	-	214	16	80	-	-	

1	2	3	4	5	6	7	8	9	10	11
Site										
Mosquitoes per site	2,743	2,850	3,152	6,322	1,889	8,312	4,821	7,540	6,832	56,982	1,557
Pools	62	68	77	139	46	157	108	150	146	162	43

GRAND TOTAL

number of mosquitoes 103,000

number of Pools 1,233

Results

In 1976, 4 confirmed cases of St. Louis Encephalities were reported in southwestern Ontario, one each from Dresden, Amherstburg, Tecumseh and Windsor. The marked decline in SLE activity in southwestern Ontario was similar to that seen in the United States. In 1975 it was estimated that over 2000 cases of SLE occurred in the U.S. whereas in 1976 ca. 100 cases of SLE were reported. A total of 1055 chicken blood samples were examined by Dr. Thorsen, Ontario Veterinary College. Only one chicken from the Windsor area (Site 9) proved positive for SLE. The infection did not appear until 30 August, 1976. This information proved invaluable when the first human cases of SLE were confirmed in mid-August of 1976. Because blood samples of sentinel chickens showed extremely low viral activity and initial human infections were late in the season, officials of the Ontario Ministry of Health were able to inform the press and the Ontario public that confirmed cases of SLE in 1976 were isolated and presumably did not represent the initiation of an SLE outbreak as occurred in Essex county during 1975.

The number of mosquitoes captured and pooled from the 11 sites monitored is presented in Table 1. The viral isolations to date (Apr. 15/77) is presented in Table 2. One isolation of St. Louis encephalities virus was made from Culex sp. (either C. pipiens or C. restuans) in 1976. The isolation occurred on August 10/76 at Windsor site 5. Four isolations of California virus have been made, 3 from Ae. trivittatus at Windsor site 9 and 1 from Culex pipiens at Windsor site 6. The California virus may or may not be pathogenic to man dependent on which sub-type of the virus is involved. The sub-type is still awaiting confirmation from the U.S. In addition to these viral isolations 22 isolations of Hart Park-Flanders virus have been made predominately from Culex pipiens mosquitoes. This virus is considered to be non-pathogenic to man and to its normal avian host. At present a virus from Aedes vexans has been isolated, the determination of which has not been made. It is not a typical arbovirus transmitted by mosquitoes.

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ESSEX COUNTY

PERMIT NUMBER W-P-1-013-76

PROGRAMME CO-ORDINATOR

Charles S. Coutts Metro Windsor-Essex County Health Unit.

518 Brighton Road, St. Clair Beach, Ontario N8N 2L6

Phone Number Home 735-2772 Business 258-2146

LARVICIDING

Larvicide Used (Formulation)	Total Quantity Used (Product)	Total Area Treated	No. of Pools	Quantity of Pesticide Unused
1. Abate 4E	250 fl. ozs.	1,520,000 sq. ft.		9 gals.+
2. Abate 2G	264 lbs.	on 7-10 day intervals		nil
3. Dursban 2E	87 ozs.			41 Ozs.

Larvicide Cost	$352.00	
Equipment Used	a) cyclone spreaders	b) C. P. 3 sprayers
Number of Pieces	4	5
Equipment Cost	$100.00	$625.00

Manpower Requirements	Man Hours	Number of Personnel
(1) Surveillance	840 supervisor	5 (inc. supervisor)
(2) Actual Treatment	2620 spraymen (4)	
(3) Total	3460 hours	

Labour Cost $16,271.00

ADULTICIDING Yes X No ____

Pesticide Used (Trade Name)	Baygon OSC
Formulation	Emulsifiable Concentrate
PCP Number	11,313
Total Quantity Used	20.75 Gallons
How Applied (Equipment)	Leco U.L.V. Unit (H.D.)
Areas Treated	Leamington, Essex, Tecumseh, St. Clair Beach, Amherstburg
How Often Was Fogging Done	Once
Man Hours Involved	90
Pesticide Cost	$602.00
Equipment Cost	$4,060.65
Labour Cost	$399.00 (60 hrs. spraymen $159.00) (30 hrs. supervisor $240.00)

TOTAL COST OF PROGRAMME: $32,501.49

COMMENTS: "Manpower requirements" does not show management staff, or administrative staff time, or costs, which went into the programme.

In 1961 the Metro Windsor-Essex County Health Unit in co-operation with the University of Windsor (N. G. Benedict) identified most of the local species of mosquitoes in a 20 mile area of the City of Windsor and its environs; this study did not reach into Essex County. From 1961-1975 there was no extended investigations into mosquito distribution nor any form of control activity. In the summer of 1975, 39 cases of St. Louis encephalitis were diagnosed in the City of Windsor and 13 in Essex County. An emergency aerial adulticiding programme in September was authorized for 100,000 acres including the City of Windsor and the contiguous area of Essex County to control further spread of the disease in 1975.

County Council approved a County wide mosquito control program in May 1976 and larviciding commenced in June although preparatory work began well in advance of this. Samples of mosquito larvae and pupae from water areas surveyed and found to be principal breeding sites were dispatched for identification to Mr. H. Wressel, an entomologist on contract with the Ministry of Environment for this purpose. Adult mosquitoes caught in traps adjacent to six sentinel chicken flocks within the County through an early warning system conducted by the University of Guelph also helped to provide data on mosquito species distribution and densities in various areas of the County over the summer.

Studies of aerial maps of the County were made and ground larvicide activities were concentrated within a two mile radius of the towns and cities in the more highly populated section of the County. Spring Aedes sp. mosquitoes were detected in late March in woodland snowmelt pools. By far the most common breeding sites for summer mosquitoes (particularly Culex restuans and Culex pipiens) were roadside ditches fed by effluent from inefficient private waste disposal systems; these never completely dried up even over prolonged dry spells when natural pools disappeared. Routine treatment of these sites (yielding 50-100 mosquito larvae per dip) had to be undertaken on a 7-10 day cycle to keep potentially enormous mosquito populations in check. A total of 34.9 acres of water were treated in this manner. Abate 4E emulsifiable concentrate was sprayed from slow moving vehicles (2). Field staff of this county programme preferred the liquid formulation of Abate (Abate 4E) over the granular formulation (Abate 2G). The granular insecticide required more storage space (because of bulk), emitted a highly offensive

odour while stored, required a face mask and goggles during application, could not be applied from a moving vehicle and was unsuitable for treatment of small areas unless applied by hand.

Up to two fluid ounces product Abate 4E was mixed with four gallons of water in back packs for treatment of approximately one acre. In initial tests using the pressurized CP-3 sprayers, discharge of four gallons through a stream jet nozzle took 14 minutes. From a van travelling a five miles per hour, a four foot wide ditch two miles in length (approximately 1 acre) was treated per tankful. Visual evaluation of ditch condition (vegetation present, organic matter) was used to determine what rate of Abate 4E (1-2 fl. oz./A) would be used. Work was done on foot where vehicle access was impossible but full spray tanks proved very heavy (50 lbs.+) to carry for long periods in the field.

Mansonia (Coquilletidia) perturbans proved to be an acute biting problem in the Leamington/Mersea areas. Larvae control is not possible for this species and an adulticide program may be to be considered in future years.

Catch basins also appeared to be a significant breeding site for Culex species by mid August when other open breeding pools were drying up.

Since organophosphorous insecticides were being used, blood cholinesterase levels of the four 'spraymen' were checked at the time of their employment, once during the season and upon leaving. No abnormal changes were recorded in these levels.

Other pesticides were used in addition to Abate. Dursban (chlorpyrifos) emulsifiable concentrate was applied to ditches in Sandwich West Township containing water with high organic content. With rains flushing principal breeding sites, treatment with Dursban was found to be necessary every 7-10 days in spite of the label restriction specifying retreatment "no more often than every two weeks". Obviously there is a problem locating an effective larvicide which can be safely used in these types of circumstances.

There was definitely a need for a pupicide where delay in follow-up treatment or late discovery of new breeding sites and where insect development had advanced beyond the larvae stage. Flit MLO was used for a minimum of experimental work locally; its effectiveness was demonstrated and increased use of this material for pupal control is anticipated in the future.

A back-up programme of adulticiding was deemed necessary mid-August due to three reasons:

1. Mansonia perturbans was abundant as adults around marshes in the Leamington area and great numbers were bothering town residents.

2. The larviciding programme initiated late had not included control of spring Aedes species and these adults in woodland areas near residences continued to be a severe biting nuisance during June and July.

3. In spite of the larviciding, Culex species were still being caught in adult traps and the County wanted to take additional

steps to reduce the probability of a local outbreak of S.L.E.

A U.L.V. fogging unit using Baygon MOS was utilized in adulticiding Leamington, Essex, Amherstburg, Tecumseh, St. Clair Beach and the Russell Woods area of Maidstone Township. Fogging was done only in the evenings 7-11 p.m. when wind was 3-8 mph and weather conditions were suitable. The noise emitted during operations eliminated the possibility of early morning fogging.

Further details of the programme including temperature data, evaluation of the programme and recommendations for 1977 are available on a more complete report prepared by Mr. C. S. Coutts of the Metro Windsor-Essex County Health Unit.

WINDSOR

PERMIT NUMBER W-P-1-006-76

PROGRAMME CO-ORDINATOR

Robert Couvillion

3125 Hartley Drive, Windsor, Ontario

Phone Number Home 944-2405 Business 252-4487

LARVICIDING

Larvicide Used (Formulation)	Total Quantity Used (Product)	Total Area Treated	No. of Pools	Quantity of Pesticide Unused
1. Abate 2G	180 lbs.	345 included were numerous catch basins	390	nil
2. Abate 4E	229 oz.			10 gals.
3. Dursban 2E	216 oz.			18 gals.
4. Flit MLO	135 gals.			nil

Larvicide Cost Used - $642.06; Not Used - $1,098.40; Total - $1,740.46

Equipment Used Back-pack sprayers, Powered Back Sprayer, Rotary Spreaders

Number of Pieces 13

Equipment Cost $1,076.04

Manpower Requirements	Man Hours	Number of Personnel
(1) Surveillance	1004	2
(2) Actual Treatment	2008	4
(3) Total	3012	6

Labour Cost $27,753.23

ADULTICIDING Yes X No _____

Pesticide Used (Trade Name)	Malathion, Baygon
Formulation	Malathion U.L.V. 95%, Malathion Mal Fog 55%, Baygon MOS
PCP Number	PCP 9337; PCP 11,314; PCP 13,212
Total Quantity Used	Malathion U.L.V. - 100 gals; Mal-Fog - 1 gal.; Baygon U.L.V. - 10 gal.
How Applied (Equipment)	Leco U.L.V., Dynafog Thermal Fogger
Areas Treated	Heavily treed, Parks, Roadsides, Ditch areas
How Often Was Fogging Done	Continuous evenings July - mid-Sept.
Man Hours Involved	464 hours
Pesticide Cost	$1,853.00
Equipment Cost	$4,709.48
Labour Cost	$3,002.00

TOTAL COST OF PROGRAMME: $49,379.66

The City of Windsor felt that they had a very successful year, and at a cost of only 25¢ per capita there was a noticeable difference in the mosquito population in Windsor.

Mosquito larvae were first discovered in the extreme west end of the City on March 19, 1976. By April 5th, larvae were found in almost every woodland pool in the west end of Windsor. By mid-April, larvae were found throughout the City.

When any area required treatment, Abate 4E was applied at the recommended rate. To expedite the operation, due to the heavy larvae population, the City began treating with Abate 2G. The results were

not very favourable, so they carried on with Abate 4E, finding it to be very effective. The most common spring species found were Aedes cinereus, Aedes stimulans and Aedes trichurus (as identified by Mr. H. Wressel of Chatham).

Summer species were found near the end of May, and the most common were Aedes vexans, Culex pipiens, and Culex restuans. In early June many areas were treated with Dursban 2E, which proved to be very effective, and resulted in a longer period of control than Abate 4E.

Because of the numerous areas to be treated, the City often found pupae present; with a combination of Dursban 2E and Flit MLO, they got very good results in the control of late stage larvae and pupae.

The adulticiding phase of the control programme was carried out in the early morning and evenings, with the use of thermal foggers and a truck mounted U.L.V. unit. Priorities for fogging were golf courses, parks, residential areas close to roadside ditches, municipal drains, heavily treed and densely vegetated areas.

Some areas required several applications, resulting in the treatment of 345 acres. Chemicals and quantities used were Abate 4E - 229 oz., Abate 2G - 180 lbs., Flit - 135 gals., Dursban 2E - 216 oz., Mal Fog - 1 gal., Malathion U.L.V. - 100 gals., and Baygon U.L.V. - 10 gals. Areas treated included woodland pools, field drainage ditches, ruts and holes in fields, construction sites, abandoned property, sewage run-off from septic tanks, municipal drains, roadside ditches and catch basins.

City abatement staff received over 200 phone calls from residents requesting information and mosquito control. Some of the requests for control were: golf courses, parks, business establishments, Windsor Airport and Peche Island Provincial Park.

The total cost for a successful programme from April to September, 1976, including wages, equipment, material, training and licence was $44,929.00 (net). The cost of overhead and supervision is not included but would be approximately 30% of net cost.

This programme was primarily for the control of the nuisance mosquito, for the City of Windsor, but was triggered by the outbreak of St. Louis Encephalitis in the Windsor area in 1975. The city felt that the programme was effective and a great success, due to the many phone calls received from residents stating that they found a noticeable reduction in the mosquito population. A lot of the success of this programme could be attributed to the great deal of effort and energy expended over the fall and winter of 1975 to document all possible breeding sites followed by excellent management of the Public Works Department field staff to continually monitor mosquito larvae population levels throughout the 1976 season.

KENT COUNTY

PERMIT NUMBER (No permit was authorized)

PROGRAMME CO-ORDINATOR

Jack Coutts C.P.H.I.(C)

R. R. #2, Tilbury, Ontario

Phone Number Home 682-2308 Business 352-7270

The Health Unit Programme under the direction of Dr. E. G. Brown in 1976 for Kent County was confined to:

1. Initial field examination of County and noting areas of flooding, woodland pools, non draining ditches and sampling of larvae.
2. Liason with Township officials with recommendation if deemed necessary, as to programme.
3. Continued monitoring of areas and sampling until September.
4. Sending of larvae specimen to Mr. H. Wressell for identification and reporting.
5. Assistance to Dr. Ayim with bleeding study of fowl in area.
6. Trapping of adults for identification (Mr. Wressell) in the Dresden area in August.
7. No larvicides were used for mosquito control in the County.

CORPORATION OF THE CITY OF CHATHAM

PERMIT NUMBER W-P-1-008-76

PROGRAMME CO-ORDINATOR

Jack Godfree, Department of Public Works

P.O. Box 640, Chatham N7M 5K8

Phone Number Home 352-8068 Business 352-4500 ext, 23

LARVICIDING

	Larvicide Used (Formulation)	Total Quantity Used (Product)	Total Area Treated	No. of Pools	Quantity of Pesticide Unused
1.	Abate 4E	170 ozs.	17 acres	32	470 ozs.

Larvicide Cost $292.00

Equipment Used C.P. Knapsack Sprayers

Number of Pieces (2)

Equipment Cost $214.00

Manpower Requirements	Man Hours	Number of Personnel
(1) Surveillance	650	2 - 3
(2) Actual Treatment	250	
(3) Total	900 plus supervision	

Labour Cost $3,477.84

ADULTICIDING Yes X No ___

Pesticide Used (Trade Name) Mal-fog 55 (Riddex)
Formulation Malathion 40% B-Butoxy B-Thiocyano Diethyl Ether 15%
PCP Number 11,314
Total Quantity Used 4.5 Gal Product
How Applied (Equipment) Curtis Dyna-fog 15 Gal. per hour
Areas Treated 15 Locations
How Often Was Fogging Done 1-5 Times
Man Hours Involved 60
Pesticide Cost $189.50
Equipment Cost $588.50
Labour Cost $240.00

TOTAL COST OF PROGRAMME: $6,327.87

COMMENTS: The Public Works Department felt that the programme was fairly effective despite the late start. If the City Council approves such a programme again in 1977, costs should be minimal as there is a fair stock of chemicals and equipment on hand.

Forty-nine pools within the city limits were monitored for mosquito production; of these seventeen were not treated. Of the remaining 32, nine were treated once, six were treated twice, six were treated three times, five were treated four times, two were treated five times, one (pool #38) 6X, one (pool #10) 8X, one (pool #24) 11X and one (pool #25) 25X. Mosquitoes found in these sites were identified by H. Wressell of the Ministry of Environment in Chatham: for example, pool #38 contained Culex pipiens, pool #10 contained Aedes vexans, pool #24 contained Aedes vexans and Culex restuans and pool #25 contained Aedes vexans and Culex restuans.

RIDGETOWN

PERMIT NUMBER W-P-1-012-76

PROGRAMME CO-ORDINATOR

Harvey Hackland PCO Services Ltd.,

489 Highbury Ave., London

Phone Number Home 681-0795 Business 425-3730

LARVICIDING

Larvicide Used (Formulation)	Total Quantity Used (Product)	Total Area Treated	No. of Pools	Quantity of Pesticide Unused
1. Abate 4E	rate of 1.5 fl. oz. per acre.		11	
2. Durban 2½ G	rate of 2 lb./acre		8	

COMMENTS: 18 pools out of at least 24 pools mapped and monitored in A1 section of Ridgetown were treated; one pool out of 19 monitored in section A3 of the city was treated. Areas of breeding site varied from wheel tracks (1 ft. square) to swamp depressions (up to 5,000 square feet); more than one treatment was necessary in some cases.

WALLACEBURG

PERMIT NUMBER W-P-1-002-76

PROGRAMME CO-ORDINATOR

George Segaert

Public Works Department, 105 Arnold Street, Wallaceburg, Ontario

Phone Number Home 627-4131 Business 627-6042

LARVICIDING

	Larvicide Used (Formulation)	Total Quantity Used (Product)	Total Area Treated	No. of Pools	Quantity of Pesticide Unused
1.	Abate 2G	57 lbs.	varies: treated at the rate of 2.5 - 5 lbs product/A.	40	18 lbs.

Larvicide Cost $24.00

Equipment Used 8 lb. capacity U.S. Borax PCB Model Spreaders

Number of Pieces 2

Equipment Cost $300.00

Manpower Requirements	Man Hours	Number of Personnel
(1) Surveillance	289	3
(2) Actual Treatment	122	2
(3) Total	411	

Labour Cost $2,055.00

ADULTICIDING Yes X No ____

If Yes:

Pesticide Used (Trade Name)	Malathion (Malfog)
Formulation	5 - 1
PCP Number	11,121
Total Quantity Used	30 gallons
How Applied (Equipment)	Dyna-fog DH 90
Areas Treated	Steinhoff Park
How Often Was Fogging Done	Before ball games, 1 time per week (sometimes twice)
Man Hours Involved	72 hours
Pesticide Cost	$139.80
Equipment Cost	$130.00
Labour Cost	$360.00

TOTAL COST OF PROGRAMME: $3,008.80

COMMENTS: Total cost of the 1976 programme includes labour cost, equipment costs, pesticides purchased, seminars and licensing.

Larviciding was done throughout the Town of Wallaceburg for Aedes and Culex species of mosquitoes. Adulticiding was done primarily for Mansonia perturbans found in swampy areas which could not be controlled through use of a larvicide. Larvae and adult mosquitoes from various sites were collected and submitted to Mr. H. Wressel for identification.

Details of the Wallaceburg programme of 1975 are recorded in the Ministry of the Environment report "Mosquito Control 1975: Municipal Abatement Programmes". The 1976 programme did not greatly differ in costs:

	1975	1976
Man Hours	330	361
Total Cost	$2,389.25	$1,650.00

A greater quantity of pesticide (larvicide and adulticide) was used as the 1976 programme was expanded to include control of Culex sp. and Mansonia perturbans but costs of some of this material and all of the equipment was carried over from the 1975 budget.

BLENHEIM

PERMIT NUMBER W-P-1-010-76

PROGRAMME CO-ORDINATOR

Harvey Hackland

PCO Services Limited, 489 Highbury Avenue, London, Ontario

Phone Number Home 681-0795 Business 425-3730

LARVICIDING

	Larvicide Used (Formulation)	Total Quantity Used (Product)	Total Area Treated	No. of Pools	Quantity of Pesticide Unused
1.	Abate 4E	Used at rate of 1.5 fl. oz product per acre			
2.	Dursban 2½G	Used at rate of 2 lb. product/acre			

COMMENTS: Many sites were monitored for mosquito production in Blenheim but only two were treated. One permanent ditch was found to need treatment six times: July 21, August 4, August 10, August 24, August 30 and September 8th. Another ditch was treated July 21 and August 4th but proved to produce no other generations of mosquitoes.

HARWICH TOWNSHIP

PERMIT NUMBER W-P-1-011-76

PROGRAMME CO-ORDINATOR

Harvey Hackland PCO Services Ltd.,

489 Highbury Avenue, London

Phone Number Home 681-0795 Business 425-3730

LARVICIDING

Larvicide Used (Formulation)	Total Quantity Used (Product)	Total Area Treated	No. of Pools	Quantity of Pesticide Unused
1. Abate 4E	rate of 1½ fl. oz. product/acre		87	
2. Dursban 2½ G	rate of 2 lbs. product/acre			

COMMENTS:

Complete details of pools monitored, pools treated, timing of treatments and quantities used are available from the PCO London Office. Most of the mosquito larvae in July and August were found in grassy ditches (both temporary and permanent) and wheel tracks; some ditches were over one mile long. Many sites had to be treated more than once.

CITY OF SARNIA

PROGRAMME CO-ORDINATOR

Harvey Hackland PCO Services Limited

489 Highbury Avenue, London, Ontario. N5W 4K2

Phone Number Business 519-452-3730

LARVICIDING

	Larvicide Used (Formulation)	Total Quantity Used (Product)	Total Area Treated	No. of Pools
1.	Abate 4E	Applied at rate of 1.5 fl. oz. product/A	Varied	17
2.	Dursban 2½G	Applied at rate of 2 pounds product per acre	Varied	6

ADULTICIDING Yes ___ No x

COMMENTS:

A number of sites required only one larvicide treatment as they dried up or were filled in. Seven sites were found producing a second generation of mosquitoes and a second treatment was necessary. Seven catch basins were found to be producing Culex restuans mosquitoes. Treatment started June 17th and ended September 3rd.

SARNIA TOWNSHIP

PERMIT NUMBER W-P-1-007-76

PROGRAMME CO-ORDINATOR

G. Mak, Lambton Engineering Limited

1315 Exmouth Street, Sarnia, Ontario, N7S 3Y1

Phone Number Home 542-2695 Business 542-7713

LARVICIDING

	Larvicide Used (Formulation)	Total Quantity Used (Product)	Total Area Treated	No. of Pools	Quantity of Pesticide Unused
1.	Dursban M	2704 litres *	3.024 acres	**61 out of 273 possible sites were treated	4.9 I.G. conc
2.	Dursban 2½G	20 lbs.	700 ft.^{2}	1	30 lbs.

*1:4400 dilution ** a large number of sites were treated more than twice

Larvicide Cost $270.50 (for 5 U.S.G. Dursban M & 50 lb. Dursban 2½G)

Equipment Used CP 3 Backpack Sprayers, Stihl Motorized Duster (borrowed)

Number of Pieces 3

Equipment Cost $334.33

Manpower Requirements	Man Hours	Number of Personnel
(1) Surveillance	700*	3
(2) Actual Treatment	233.5*	2
(3) Total	933.5	3

*Estimate Only

Labour Cost $8,677.75 (estimate only)

ADULTICIDING Yes X No ____

Pesticide Used (Trade Name)	Dursban 6
Formulation	1:49 Dilution with Fuel Oil
PCP Number	11450
Total Quantity Used	65.5 I.G. 1:49 mixture
How Applied (Equipment)	Dynafog DH 180 Thermal Fogger
Areas Treated	8 locations: total area 8.035 acres
How Often Was Fogging Done	varied with need; 1 - 4X total
Man Hours Involved	31
Pesticide Cost	$396.00
Equipment Cost	$570.26
Labour Cost	$288.02 (estimate only)

TOTAL COST OF PROGRAMME: $8,965.77 * *including overhead and chemicals

COMMENTS: Larviciding equipment cost includes sprayers, dippers and all safety equipment. Adulticiding equipment cost includes cost of foggers only. No detailed records were kept to distinguish surveillance time and actual treatment time.

The personnel conducting mosquito control in Sarnia Township were all full-time employees of Lambton Engineering; personal relations of the employees with Township residents and newspaper advertising and publicity were found to be very helpful in obtaining assistance from many people in the area which made the programme as effective as possible.

In preparing maps of all potential breeding sites, all available information such as topographical maps, drainage maps and road maps were used. A series of aerial photographs taken May 27th was also used and personal knowledge of actual field conditions was invaluable. Also, an aerial survey was made of the entire Township with infra-red

photography. Because of the nature of the film, there is a clear distinction between water and surrounding areas, even if the pool is very shallow. As a result, this technique could be used to map unknown territory quickly, efficiently and at a minimum cost.

The map of possible breeding sites was continuously modified throughout the season. As areas were treated, location and date were recorded on maps designated as 'treated mosquito sites'; a new map was constructed for each month.

Dursban M (liquid) was the larvicide used because of availability, ease of application in small areas and absence of dusting problems found with granular formulations.

Blood cholinesterase levels were monitored in the field crew throughout the season; no significant drop of cholinesterase levels was found in any of the personnel.

Larviciding commenced too late to include spring species. Close surveillance (at least once every 10 - 14 days) of all suspected breeding sites of summer species and constant investigation of new sites as reported by local residents helped keep larvae populations low. Treatment started June 18th; any pool containing more than 5 larvae per dip was treated. Greatest concentrations of larvae were found in grassy ditches high in organic matter. Identification of larval samples from representative sites was made by Mr. H. Wressel of Chatham.

The CP-3 backpack sprayers were calibrated using water; the area sprayed was measured as a function of the amount of water used. A calibration table was then made up, indicating the rate of Dursban M to be added per litre of water in the tank, and taped onto the side of the tank. Because of the small (less than 5 cc) amounts of concentrate added to a full tank (18 litres), glass syringes were used to transfer the concentrate from the original container to the spray tank. Plastic syringes were found to become sticky with use. In the field, a jar of concentrate (fully labelled and well protected against shock and spillage) rather than the larger original container was carried on the truck to allow for quick refilling of the tanks.

Larviciding commenced June 18th and continued all summer; treatment was made whenever larvae were found in densities of five or more per dip. Post-treatment checks indicated that a 100% kill was realized in almost all cases. When the kill rate was less, the reason could be traced back to dilution of the larvicide (by rain or pumping of water into an area). The liquid formulation was preferred where breeding sites were small; for larger areas such as construction sites, the granular formulation was preferred.

Adulticiding made use of a Dursban 6 - diesel fuel mixture through a Dyna-fog DH 180 thermal fogging machine. Fogging was carried out between 5 and 8 a.m. or 7 and 10 p.m. when weather conditions permitted in areas where large adult mosquito populations were found and in areas where a large number of complaints were received. The efficacy was checked through subsequent use of a CDC light trap; fogging was also found to have a profound psychological

effect on local residents. Fogging had excellent results but the effect was only temporary. Since the species of adults trapped did not match the species of larvae caught, it was assumed that these mosquitoes had moved in from adjacent areas where no abatement programme existed.

Two sites that proved to be major producers of Culex pipiens were land-filled once the owners of these low swamp areas were contacted for co-operation.

Because of the nature of the pesticides used; monogoggles, respirators and rubber gloves were worn whenever larviciding or adulticiding was done; plastic aprons were also used whenever the insecticide concentrate was handled. Monthly checking of plasma cholinesterase levels of all staff actively engaged in the programme showed no significant drop during the summer.

MOORE TOWNSHIP

PERMIT NUMBER W-P-1-007-76

PROGRAMME CO-ORDINATOR

Gerrit Mak

Lambton Engineering Company Limited

1315 Exmouth Street, Sarnia, Ontario N7S 3Y1

Phone Number Home 438-7878 Business 542-7713

LARVICIDING Yes _____ No ___X___

ADULTICIDING Yes _____ No ___X___

COMMENTS:

No mosquito control either larviciding or adulticiding was done in Moore Township. Lambton Engineering was commissioned to survey breeding sites only and identify larvae species where breeding pools were identified.

LONDON

PERMIT NUMBER W-P-1-004-76

PROGRAMME CO-ORDINATOR

G. D. Rodgers City of London Engineer's Department

P.O. Box 5035, London, Ontario N6R 4L9

Phone Number Home 686-5266 Business 679-4585

LARVICIDING

Larvicide Used (Formulation)	Total Quantity Used (Product)	Total Area Treated	No. of Pools	Quantity of Pesticide Unused
1. Abate 4E	1.5 gals.	58 3/4 ac.	116	.5 gal.

Larvicide Cost 69.95 + tax per gal.

Equipment Used Knapsack motorized misting machines

Number of Pieces 3 (1 standby)

Equipment Cost $330.00 + tax per machine - 2 purchased in 1975

Manpower Requirements	Man Hours	Number of Personnel
(1) Surveillance	1060	2
(2) Actual Treatment	390	2
(3) Total	1,450	

Labour Cost $7,630.00

ADULTICIDING Yes X No ___

Pesticide Used (Trade Name) Riddex Mal-Fog 55

Formulation

PCP Number 11314

Total Quantity Used	approx. 20 gals.
How Applied (Equipment)	Swingfog SN7 London Fogger "500"
Areas Treated	Bush areas near residential development, golf courses, etc.
How Often Was Fogging Done	47 fogging treatments
Man Hours Involved	195
Pesticide Cost	$84.75
Equipment Cost	$1,085.00
Labour Cost	$1,465.00

TOTAL COST OF PROGRAMME: $13,350.00

Details of the City of London's mosquito abatement programme has been previously documented in the Ministry of Environment's report "Mosquito Control 1975, Municipal Abatement Programmes." Activities for nuisance control of spring and summer Aedes species for 1975 cost $6,680.00. Late in the fall of last year, activity in detecting breeding sites of Culex species, increased adulticiding, and late date extension of the programme into October made necessary an expansion of this budget by an additional $2,000. In 1976 reduction of both the Aedes and Culex species of mosquitoes meant a considerable expansion of the surveillance aspects of the programme; thus costs in 1976 amounted to $13,350.00.

Through previous experience, it was anticipated in May 1976 that approximately 80 to 150 acres of potential breeding sites would have to be monitored for mosquito production. In fact 58.75 acres actually had to be treated; a total of 1.5 gallons Abate 4E was used in 1976 as

compared to one gallon Abate 4E total in 1975. Much of the cost of this additional year's programme over 1975 was labour in the surveillance part of the programme and more frequent use of adulticides in bush areas near residential developments and golf courses.

ELGIN COUNTY

PERMIT NUMBER W-P-1-005-76

PROGRAMME CO-ORDINATOR

Ray Collard, Elgin County Roads Department

79 Stanley Street, St. Thomas, Ontario N5R 3G1

Phone Number Home 644-1421 Business 631-5880

LARVICIDING

Larvicide Used (Formulation)	Total Quantity Used (Product)	Total Area Treated	No. of Pools	Quantity of Pesticide Used
1. Abate 2G	90 lbs.			1910 lbs.

Larvicide Cost	$1,246.08 + tax
Equipment Used	KWH 66D Motorized Applicator
Number of Pieces	2
Equipment Cost	$939.00 + tax
Tax for Larvicide & Equipment Costs	$215.26
Freight Costs	87.90

Manpower Requirements	Man Hours	Number of Personnel
(1) Surveillance	900 ±	4
(2) Actual Treatment	100 ±	6
(3) Total	1000 ±	10

Labour Cost $4,860.00 ± (Roads Department Only)

ADULTICIDING Yes X No ___

Pesticide Used (Trade Name):	Baygon
Formulation	
PCP Number	
Total Quantity Used:	5 gallons, 10 gallons remaining
How Applied (Equipment)	3 Dyna-fog DH 180 and 1 DH90 machines
Areas Treated:	Parks, Camp Grounds, Ball Parks, etc.
How Often Was Fogging Done:	Day or Night before use for Ball Parks, Fair Grounds etc., weekly for others.
Man Hours Involved:	100 ±
Pesticide Cost	$199.75
Equipment Cost	1190.00 Tax for both $65.62 + $41.65 = $106.27, Freight: $7.40.
Labour Cost:	$600.00 +

TOTAL COST OF PROGRAMME $11,809.38 (Includes cost of training, etc.)

COMMENTS:

Above figures do not include $1,680.00 ± spent by Conservation Authorities for labour on mapping, etc. Cost of vehicles used would be approximately ($637.50, (actual for County) included in above figures), $380.00 Kettle Creek Conservation Authority.) No mileage kept for Health Unit Inspectors, estimated vehicle cost for Health Unit is $100.00 ±. An overall cost including the above and excluding Public Health Inspectors labour costs would be $13,888.38 ±.

Commitment for a county wide programme was made April 9th, nine municipality employees were licenced, one operator with the County Roads Department and eight exterminators: four to the County Roads Department, two to the Health Unit and two to the City of St. Thomas.

Surveillance for possible mosquito breeding sites began April 20th. Working one Township at a time using maps scaled 1 inch = 1 mile, a series of grids approximately one mile square were established and identified by an alphabet coding system contour maps and aerial photographs scale 1 inch = 200 feet were used with the grid maps to produce a series of folders on which any pools or ponds could be recorded.

Abate 2G was applied by two KWH-66D Motorized Granular Applicators. Late June these machines were calibrated with sales company assistance using dust-bane sweeping granules which were equal in size and weight to Abate. In trial runs over a paved parking lot adjustments were made to discharge the prescribed amount per minute; this was found to be a concentration of 14-18 granules per square foot average while walking four miles per hour discharging a 50-60 foot swath. Both machines required different settings to achieve the required rate of application although they were new machines and identical in make.

Actual breeding sites were recorded and monitored commencing mid June. Only pools with large larvae counts were treated. Mosquito larvae and adult samples submitted through the Elgin-St. Thomas Health Unit were identified by contract entomologists with the Ministry of Environment.

On July 12 the Kettle Creek Conservation Authority authorized staff to participate in mosquito larvae surveillance on the entire Kettle Creek watershed.

Because of the Roads Department workload, co-ordinating responsibilities of the mosquito abatement programme was transferred to the Elgin - St. Thomas Health Unit (J. Elley, Chief Public Health Inspector) 2 Wood Street, St. Thomas N5R 4K9, July 8th.

In mid August when St. Louis encephalitis human cases were being detected in Essex and Kent Counties, the Elgin County programme was augmented by adulticiding particularly around recreational areas such as baseball fields, beach areas and camp grounds: the County used two Dyna-fog DH 180 machines, the township of Yarmouth - one machine and the Village of Port Burwell, a smaller DH 90 machine.

Mosquito larvae proved to be very sparse in permanent and temporary waters. Catch basins, manholes and two sewage lagoons (Port Stanley and Port Rodney) were the main source of larvae and were thus treated. Regular Abate granular treatments of 40-45 granulars per catch basin provided excellent results. The programme ended September 17th.

OXFORD COUNTY

PERMIT NUMBER W-P-1-001-76

PROGRAMME CO-ORDINATOR

Michael Woodcroft

Oxford County Engineers Office, Court House, Woodstock

Phone Number Business 537-7961

LARVICIDING

	Larvicide Used (Formulation)	Total Quantity Used (Product)	Total Area Treated	No. of Pools	Quantity of Pesticide Unused
1.	Abate 2G	2.5 to 5.0 lb. granular per 1 acre of water	100 acres	178	120 lbs.

Equipment Used Coveralls, rubber gloves, insect repellent, mask, white enamel dipper

Number of Pieces rotary spreader

Cost $4,000.00

Manpower Requirements	Man Hours	Number of Personnel
(1) Surveillance	1335	4 + (2 x ½)
(2) Actual Treatment	1335	
(3) Total	2670	

Labour Cost $9,343.00

ADULTICIDING Yes X No _____

Pesticide Used (Trade Name)	Malathion
Formulation	
PCP Number	
Total Quantity Used	1 gallon
How Applied (Equipment)	fogger, backpack
Areas Treated	sewage lagoons
How Often Was Fogging Done	twice over the summer
Man Hours Involved	20
Pesticide Cost	$14.00
Equipment Cost	
Labour Cost	$70.00

TOTAL COST OF PROGRAMME: $13,427.00

1976 was the first year mosquito abatement was attempted in Oxford County. Two permanent County employees obtained exterminator's licences for the use of Abate 2G granular larvicide and one employee obtained an operator's licence and aquatic nuisance control permit; four post-secondary students were hired to work under the exterminator's licences. All potential breeding sites in and around urban areas were surveilled for mosquito production and treated when larvae were detected in number greater than ten per dip. Private property and rural areas were treated at the owner's request.

For ease of record-keeping and monitoring larval hatches, the rural area was divided into three units (A1, A2 and A3) and each of the breeding sites in each of these units as well as the cities of Woodstock, Ingersoll and Thamesford were designated by a letter and number code.

Immediate follow-up was conducted to determine larval kill. Mosquito larvae from typical sites were submitted for identification by Mr. W. C. Allen, an entomologist on contract with the Ministry of the Environment. A full report on this programme is available from the County of Oxford Public Works Department.

REGION OF HALDIMAND-NORFOLK

PERMIT NUMBER W-P-2-016-76

PROGRAMME CO-ORDINATOR

Donald W. Brooks Regional Roads Engineer, Regional Municipality of Haldimand-Norfolk

Box 601, Simcoe Ontario N3Y 4M1

Phone Number Home 426-2779 Business 428-0150

LARVICIDING

Larvicide Used (Formulation)	Total Quantity Used (Product)	Total Area Treated	No. of Pools	Quantity of Pesticide Unused
1. Abate 2G	100 lbs.	Too varied to detail		3900 lbs.

Equipment Used: No hand spreaders used. Heavy equipment in waste disposal areas

Cost: $2,000.00 (Disposal areas).

Manpower Requirements	Man Hours	Number of Personnel
(1) Surveillance	400	2
(2) Actual Treatment	200	2
(3) Total	600	

Labour Cost: $3,600.00

TOTAL COST OF PROGRAMME: $9,600.00

The Regional Municipality of Haldimand-Norfolk mosquito control programme involved treatment of mosquito breeding sites along the regional road right-of-ways. Mosquitoes were not found to be plentiful on regional property (which of course was only a small percentage of the total area) with the exception of waste disposal areas. The programme was found to be minimally effective since it was mounted late in the season and did not enlist the co-operation and participation of all the local authorities.

BRANT COUNTY

PERMIT NUMBER W-P-2-012-76

PROGRAMME CO-ORDINATOR

E. Gerald Axworthy Brant County EMO

P. O. Box 756, Brantford

Phone Number Home 442-3013 Business 753-1460

LARVICIDING

	Larvicide Used (Formulation)	Total Quantity Used (Product)	Total Area Treated	No. of Pools	Quantity of Pesticide Unused
1.	Abate 2G	29.25 lbs	5.26 acres	29	1287.65 lbs.
2.		3.10 lbs	tires, barrels, etc.		
		32.35 lbs			

Equipment Used Cyclone seed sower

Respirators, protective clothing for three persons, dippers, repellent etc. $150.00

Number of Pieces Three

Cost $45.06

Manpower Requirements	Man Hours	Number of Personnel
(1) Surveillance	944	2
(2) Actual Treatment	80 (rough estimate only)	2
(3) Total	1024	2

	WAGES	WCB	FRINGE		
Labour Cost	4,047.60	30.36	150.87	=	4,228.83 (for two students)

TOTAL COST OF PROGRAMME:	ACTUAL COST	BUDGET
Salaries	$4047.60	$4200.00
" - Supervisory	1000.00	---
Fringe Benefits	150.87	185.00
Workmen's Compensation	30.36	360.00
Travel - Van Rental	400.00	400.00
- Mileage	1266.07	1440.00
Supplies (Abate $901.82)	1236.59	1500.00
Publicity	71.91	500.00
Express	30.10	50.00
Licences, Insurance & Training	287.35	420.00
Workmen's Compensation for Mosquito Officer	30.00	350.00
TOTAL	$8550.85	$9405.00

COMMENTS:

The mosquito control officer spent an estimated 475 hours on the program (administration, PR, field work etc.) between May 25 and Sept. 25. This does not include training by MOE or time spent prior to May 25 or after Sept. 25.

Mosquito larvae found in Brant County were dispatched to Mr. G. Dustan Vineland on contract with the Ministry of Environment for mosquito identification. Breeding sites detected were either treated with Abate granular or drained of water. Where larvicide was used, a 24 hour post-treatment check was used to determine larvae mortality. Of particular problem were piles of old tires found in Paris (Paris Tire Company), Brantford Township (Brantford Rubber), and Brantford (Brantford Tire Exchange, Tire City and Uniroyal) which were found to be producing predominantly Culex restuans but also Culex pipiens and Culex territans. Both use of larvicides and emptying tires of water proved to be ineffective.

Kitty litter material was found acceptable for use in calibrating granular seeders. Double bagging granular sacks in extra-large heavy duty polyethylene garbage bags reduced odour problems during storage.

The City of Brantford was divided into districts for the purposes of monitoring and treatment and proved to produce very few mosquitoes. The City is well drained and little standing water existed long enough for mosquitoes to develop. Rural areas within the County were monitored by township with Burford Township divided into North and South Sections. Practically all defined breeding sites were on private property and permission was sought before any inspections or treatments were made. Travel routes were eventually established which would allow all known breeding sites of summer Aedes vexans to be checked within a day following a rainfall significant to cause hatching.

The medical Officer of Health was updated on abatement activities weekly and publicity releases and newspaper and radio coverage resulted in citizen response reporting possible breeding sites.

REGIONAL MUNICIPALITY OF WATERLOO

PERMIT NUMBER W-P-2-015-76

PROGRAMME CO-ORDINATOR

Colin Galloway

Regional Municipality of Waterloo, Roads Supervisor

Marshland Centre, Waterloo, Ontario

Phone Number Home 632-7555 Business 885-9430

LARVICIDING

	Larvicide Used (Formulation)	Total Quantity Product Used (Lbs./No.)	Area (Acres)	No. of Pools	Larvicide Balance (Lbs./No.)
KITCHENER	Abate 2G	186.75	48.9	19	517.25
	Tossit Capsules	87			153
WATERLOO	Abate 2G	29	7	3	279
	Tossit Capsules	--			240
CAMBRIDGE	Abate 2G	4	1	1	304
	Tossit Capsules	--			240
WOOLWICH	Abate 2G	30	7.1	11	410
	Tossit Capsules	--			240
WILMOT	Abate 2G	26	6.5	4	326
	Tossit Capsules	--			240

Wellesley and North Dumfries Townships used no chemicals, therefore they have the quantities they were allotted in 1976 for used in 1977.

WELLESLEY	-	Abate	308 lbs.
		Tossit	240 caps.
NORTH DUMFRIES	-	Abate	220 lbs.
		Tossit	320 caps.

Abate granular was applied by nine motorized backpack sprayers and a number of cyclone spreaders.

Areas where mosquito larvae were found and treatments made are listed as follows:

WATERLOO

1. Rolling Hills Creek between Glenforest Boulevard and Rolling Hills Drive, July 19, 1976.
2. Hillside Park to left of Park entrance, June 18, 1976.
3. Bechtel Park off Sandowne Drive, July 19, 1976.

KITCHENER

4. East of St. Leger Street between Wellington Street and Guelph Street.
5. Southwest of River Road at Dryden Greenway.
6. Shoemaker Greenway at the Expressway overpass on Westmount Road.
7. West of Homer Watson Boulevard south of Ottawa Street.
8. Dryden Greenway by Shelley Drive southwest of Wilson Avenue.
9. Swamp in bush either side of River Road south of Rennie Drive.
10. East of Strasburg Road just south of Blockline Road.
11. West of Strasburg Road south of Blockline Road.
12. East of River Road south of Fairway Road.
13. East of Forwell Road north of Ebydale Drive near Grand River.
14. West of Zeller Drive just south of sharp right hand bend.
15. Sandrock Greenway south east of Royal Orchard Drive.
16. Northeast of intersection of Hidden Valley Drive and Goodrich Drive.
17. North of south leg of Hidden Valley Drive just before sharp left bend.
18. Schneider Greenway north of the intersection of Homer Watson Boulevard and Huron Road.
19. Schneider Greenway at west side of Homer Watson Boulevard.

KITCHENER Cont'd.

20. Schneider Greenway at south side of Doon Village Road.

21. Creek at Doon Village Road just west of Homer Watson Boulevard.

22. Picnic area at the intersection of Regional Road 12 and 28, September 7, 1976.

TOWNSHIP OF WOOLWICH

23. Northeast of Floradale, June 29, 1976.

24. South of Woolwich Road #2 at the top end of the Woolwich Reservoir, June 29, 1976.

25. South of First Street (Elmira) between R.R. tracks and Cannagagigue River, July 5, 1976.

26. The Grand River at West Montrose, August 16, 1976.

27. North of Walter Street (Maryhill), June 29, 1976.

28. Southwest of Berlin Street (Breslau), August 16, 1976.

29. Lot 109 north of Township Road #80, June 29, 1976.

TOWNSHIP OF WILMOT

30 & 31. Both sides of Perth Street (New Hamburg) just north of R.R. tracks July 8, 1976.

32. Southwest of the Village of St. Agatha, June 30, 1976.

33. South of Regional Road #6 on Trussler Road (at Waldau), June 30, 1976.

34. To the east of Regional Road #12 just north of the Dundee Country Club, June 30, 1976.

CITY OF CAMBRIDGE

35. Gabian settlement pools near Strathcona Avenue in Hespeler.

ADULTICIDING Yes _____ No X

The total cost of the 1976 programme was $21,159.14. A summary of this expenditure was as follows:

	Labour	Fringe Benefits	Equipment	Supplies and Materials	Mileage	Misc.	Total
	$	$	$	$	$	$	$
Cambridge	3,536.52		295.45	206.26		2.10	4,040.33
Kitchener	6,231.93	2,804.37	393.87	184.90			9,615.07
- overhead	436.23	196.30	27.57	12.95			673.05
Waterloo	1,071.75						1,071.75
- overhead	234.34						234.34
N. Dumfries	894.88	37.05		144.01	99.15	5.00	1,180.09
Wellesley	630.12	47.06	120.00	43.61	144.00		984.79
Wilmot	507.75	1.89				27.80	537.44
Woolwich	668.00	26.23		53.16	151.98		899.37
Reg. of Waterloo	923.60	230.90	5,325.36	2,006.19		1,477.54	9,963.59
	15,135.12	3,343.80	6,162.25	2,651.08	395.13	1,512.44	29,199.82
Ministry of Health - 75% Subsidy			4,621.69	1,988.31	296.35	1,134.33	8,040.68
	15,135.12	3,343.80	1,540.56	662.77	98.78	378.11	21,159.14

HAMILTON-WENTWORTH

PERMIT NUMBER W-P-2-009-76

PROGRAMME CO-ORDINATOR

A. A. Tomlinson, Hamilton-Wentworth Health Unit

74 Hughson Street South, Hamilton, Ontario

Phone Number Home 385-8552 Business 528-1441

LARVICIDING

	Larvicide Used (Formulation)	Total Quantity Used (Product)	Total Area Treated	No. of Pools	Quantity of Pesticide Unused
1.	Abate 2% granular	440 lbs.	560 acres	224 out of 3,056 pools that were monitored	560 lbs.
2.	Abate 4E liquid	1 gal.			4 gals.
3.	Pyrethrum Capsules	900 capsules			1,100 capsules

Equipment Used	Nozzle sprayers, hand sprayers, protective equipment		
Number of Pieces	2	3	20
Cost (Larvicide and equipment)	$3,938.49		

Manpower Requirements	Man Hours	Number of Personnel
(1) Surveillance	1,757	3
(2) Actual Treatment	448	
(3) Total	2,205	

Labour Cost	$12,098.00
Travel Cost	$ 3,250.00

ADULTICIDING Yes X No ____

Pesticide Used (Trade Name)	Malathion (Riddel Mal-Fog 55)
Formulation	Malathion and Fuel Oil
PCP Number	
Total Quantity Used	7 gallons
How Applied (Equipment)	Tifa Fogging Machine
Areas Treated	Bushland
How Often Was Fogging Done	8 times
Man Hours Involved	32
Pesticide Cost	$284.25
Equipment Cost	$375.00
Labour Cost	$120.00

TOTAL COST OF PROGRAMME: $20,065.74

COMMENTS: Initial budget for the 1976 programme was $24,000.00.

Larviciding was undertaken whenever larval count exceed ten per dip. Mosquito identification was provided by Mr. G. Dustan of the Ministry of the Environment. Most of the work involved the monitoring of all possible breeding sites; if required, crews were directed to work weekends. If additional personnel were required in several areas at once, provisions were made to hire extra staff on a day-to-day basis to help the team. Larviciding for both spring and summer populations of mosquitoes started on April 29th and ended late August, when cool weather cut insect activity. Sources of mosquitoes proved to be very small: only 7% of the mapped wet areas actually produced mosquitoes.

Of the 224 sites treated (out of the 3,056 sites monitored), largely in the Vineland area, 116 contained Culex pipiens larvae (51.8%). In the period of July 8th - September 3rd, the largest proportion of the mosquito breeding sites proved to be generating Culex sp. (88%).

Weather conditions were monitored locally. 1976 was not representative of a typical summer; rainfall in May was above average but June and August were below average. Rainfall during July was average for only 13 days. Therefore the resultant mosquito population may have been low this year; but cool humid conditions could prolong adult life expectancy.

Where larvicides were used, the pools were marked by student pesticide applicators. Their productivity was checked by random inspections by a control officer who made the post-treatment mortality checks.

The Hamilton-Wentworth Health Unit augmented their actual abatement programme with a comprehensive public education campaign using all media; newspapers, radio and television to clarify exactly what was being done. Further details of the programme are available from the Health Unit.

REGIONAL MUNICIPALITY OF NIAGARA

A central mosquito control co-ordinator for abatement programmes of all the municipalities within the Region of Niagara existed in the person of Mr. Brian H. Sullivan, of the Public Works Department of the Regional Municipality of Niagara. As well as supervising the local larviciding programme on regional property, he purchased pesticide and equipment on behalf of all cities, towns and townships within the area, provided general guidance to all staff and became the liason between mosquito abatement in this area and Ministry of Environment staff in Toronto. A technical committee on mosquito control was formed and now meets regularly to report on current activities; a list of members is attached. Summaries of some of the individual programmes follow.

TECHNICAL COMMITTEE ON MOSQUITO CONTROL

April 1976

Organization	Contact & Telephone	Mailing Address
City of Welland	Jack Price 735-5041	City of Welland Parks Department P.O. Box 251, Welland, Ontario L3B 5P4
Town of Grimsby	Ian Neville 945-5484	Town Hall 114 Main Street West Grimsby, Ontario L3M 4G3
Town of Lincoln	John Hodgkins 563-8229	Town Hall P.O. Box 1030 Lincoln, Ontario LOR IBO
City of Thorold	Jim Cruickshank 227-6613	City Hall P.O. Box 1044 Thorold, Ontario L2V 4A7
City of Niagara Falls	Nick Swec 356-1355 295-4508 (after hours)	Niagara Falls Service Centre 3200 Stanley Avenue Niagara Falls, Ontario
Town of Niagara-on-the-Lake	Nick Janzen 468-3266 468-2747 (cemetery)	Town of Niagara-on-the-Lake P.O. Box 520 Niagara-on-the-Lake, Ontario, LOS IJO
City of St. Catharines	Jim Horton 688-5600	City Engineering P.O. Box 3012 St. Catharines, Ontario L2R 7C2
City of Port Colborne	Renie Landry 835-2900 Ext. 49	City Hall 239 King Street Port Colborne, Ontario L3K 4G8
Township of West Lincoln	Ed Griffin 957-3396	P.O. Box 189 Smithville, Ontario LOR 2AO

Technical Committee on Mosquito Control

Township of Wainfleet	Phil Schertzing 835-2650	R.R. #2 Port Colborne, Ontario L3K 5V4
Town of Fort Erie	Leo Roach 871-1600	Town Hall 200 Jarvis Street Fort Erie, Ontario L2A 2S6
Town of Pelham	Gord White 892-2607	Town Hall 40 South Pelham Street P.O. Box 400 Fonthill, Ontario LOS IEO
Ministry of Transportation and Communications	Jim Nation 637-5625 (District)	112 North Shore Blvd. P.O. Box 5020 Burlington Ontario L7R 3Z9
	Andy Stripnieks 248-3206 (Central)	M.T.C. 1201 Wilson Avenue Room 221B Central Building Downsview, Ontario M3M IJ8
Niagara Peninsula Conservation Authority	Jim Manicom Jack Hutton Marg Miller 892-2609	N.P.C.A. P.O. Box 460 Fonthill, Ontario LOS IEO
Ministry of the Environment	Atef Tewfik 561-7410	140 Centennial Pkwy. N. Stoney Creek, Ontario L8E 3H2
Niagara Parks Commission	Ross Wood 356-2619	N.P.C. P.O. Box 150 Niagara Falls, Ontario L2E 6T2
Ontario Hydro	Jerry Vassey 529-7111 Ext. 358	1053 Main Street West Hamilton, Ontario L8M IN5
Department Public Works Canada	Adrien Tenden 735-4211	38 King Street Welland, Ontario L3B 3H9

Technical Committee on Mosquito Control

Ministry of the Environment (Entomologist)	Gord Dustan 562-4835	428 Victoria Avenue Vineland Station, Ontario LOR 2EO
Ministry of Natural Resources	R. Craig 892-2656	P.O. Box 1070 Fonthill, Ontario LOS IEO
Niagara Regional Health Unit	Dr. Burkholder Dr. Meyer Dr. Grant 735-5697	King & Fourth Streets Welland, Ontario L3B 3LI
Lincoln County Board of Education	Mr. Howard Byford 227-5909	69 Mountain Street St. Catharines, Ontario

Municipality or Agency	Purchase	Cost
City of Thorold	12 bags of Abate 2G 44 lbs. bags @.56/lb	$ 295.68
Town of Niagara-on-the-Lake	4 bags of Abate 2G 1 66D Kem San Blower 1 Hand Spreader	98.56 416.00 14.50
City of Welland	9 bags of Abate 2G 2 gallons of Abate 4E 2 66D Kem San Blowers 2 Hand Spreaders	221.76 122.00 832.00 29.00
City of Port Colborne	23 bags of Abate 2G 2 66D Kem San Blowers	566.72 832.00
City of Niagara Falls	23 bags of Abate 2G 4 66D Kem San Blowers	566.72 1,664.00
Town of Lincoln	7 bags of Abate 2G 1 66D Kem San Blower	172.48 416.00
Town of Grimsby	12 bags of Abate 2G 1 66D Kem San Blower	295.68 416.00
Town of Wainfleet	14 bags of Abate 2G 1 66D Kem San Blower 1 Hand Spreader	344.96 416.00 14.50
Township of West Lincoln	5 bags of Abate 2G 2 66D Kem San Blowers	123.20 832.00
Town of Pelham	3 bags of Abate 2G 1 66D Kem San Blower	73.92 416.00
Ontario Hydro	5 bags of Abate 2G 2 66D Kem San Blowers	123.20 832.00
Niagara Parks Com.	5 bags of Abate 2G 1 gallon of Abate 4E	123.20 61.00
Department of Public Works Canada	5 bags of Abate 2G 2 gallons of Abate 4E 1 66D Kem San Blower 1 Hand Spreader 1 10H 180 Fogger	123.20 122.00 416.00 14.50 547.80

Municipality or Agency	Purchase	Cost
Niagara Peninsula Conservation Authority	45 bags of Abate 2G	$ 1,108.80
	2 66D Kem San Blowers	832.00
Regional Municipality of Niagara and 12 Local Municipalities	2,000 tossit capsules	320.00
	TOTAL	$13,803.38*

*This is the cost of insecticide and equipment only for the Regional Programme and all municipalities encompassed therein. This does not include labour.

THE REGIONAL MUNICIPALITY OF NIAGARA

PERMIT NUMBER W-P-2-007-76

PROGRAMME CO-ORDINATOR

Brian Sullivan

P.O. Box 3025, St. Catharines, Ontario L2R 7E9

Phone Number Home 935-0286 Business 685-1571

LARVICIDING

	Larvicide Used (Formulation)	Total Quantity Used (Product)	Total Area Treated	No. of Pools	Quantity of Pesticide Unused
1.	Abate 2G (Gran.)	680 lbs.	54 Swath Mi.	5	420 lbs.
2.	Malathion (Liq.)	8 oz.	-	-	8 oz.
3.	Tossit (Capsules) Pyrethrin	200 Caps	.5 Acres	-	440 Caps.

Larvicide Cost $650.00

Equipment Used KWH 66D Back Pack Sprayer Cyclone hand spreader

Number of Pieces 4 6

Equipment Cost $416.00 each $14.00 each

Manpower Requirements	Man Hours	Number of Personnel
(1) Surveillance	80-85%	5 Total
(2) Actual Treatment	15-20%	2 Full-time
(3) Total	613	

Labour Cost $3,700

ADULTICIDING Yes _____ No X

TOTAL COST OF PROGRAMME: $7,700.00

Active larvicide treatments commenced June 25th and ended September 23rd. A daily routine was established in which regional roadside ditches in different municipalities were checked on a regular basis and where warranted, treatment took place. A mobile two men crew using a 66D power back sprayer dispensing four pounds product Abate 2G per acre mounted on a ½ton pick-up truck calibrated for a vehicle speed of eight miles per hour covered some 54 swath miles of ditches during this time period.

WELLAND

PERMIT NUMBER W-P-2-006-76

PROGRAMME CO-ORDINATOR

Jack Price, General Foreman

Welland Parks and Cemetery Department, P.O. Box 251, Welland L3B 5P4

Phone Number Home 732-6337 Business 735-5041

LARVICIDING

	Larvicide Used (Formulation)	Total Quantity Used (Product)	Total Area Treated	No. of Pools	Quantity of Pesticide Unused
1.	Abate 2-G	154 lbs.	30.5 acres		252 lbs.
2.	Abate 4-E	7 oz.	4.6 acres		313 oz.

Equipment Used	2-66 D Kem San Blowers	@ $832.00	
Number of Pieces	1-Hanson Sprayer	N/C	-------
Cost	2-Hand Spreaders		29.00
		Total	$861.00

Manpower Requirements	Man Hours	Number of Personnel
(1) Surveillance)		
)	446.1	2 - 4
(2) Actual Treatment)		
(3) Total	446.1	

Labour Cost $2,505.25

ADULTICIDING Yes _____ No __X__

TOTAL COST OF PROGRAMME: $6,175.45

COMMENTS:

Although no major problems were experienced, some of the minor ones are as follows:

1. Keeping the equipment properly calibrated.
2. Relating the size of the area to the amount of chemical used. Examples are ditches and tire tracks.
3. Weekends are at overtime rates thus very little control was carried out making it difficult to be 100% effective if the best time for chemical application happened to be on a Saturday or Sunday.

TOWN OF GRIMSBY

PROGRAMME CO-ORDINATOR

Ian Neville, Town of Grimsby, Department of Public Works

114 Main Street West, Grimsby, Ontario L3M 4G3

Phone Number Business 945-5484

LARVICIDING

	Larvicide Used (Formulation)	Total Quantity Used (Product)	Total Area Treated	No. of Pools	Quantity of Pesticide Unused
1.	Abate 2G	44 lbs.	9,273s.y.	24	484 lbs.

Equipment Used KWH Whirlwind

Number of Pieces One

Cost $149.75

Manpower Requirements	Man Hours	Number of Personnel
(1) Surveillance	80	1
(2) Actual Treatment	40	1
(3) Total	120	1

Labour Cost $680.00

ADULTICIDING Yes _____ No X

TOTAL COST OF PROGRAMME: $1,238.76

COMMENTS:

Material Cost	220.15
Mileage Cost	60.86
Insurance Cost	128.00

TOWN OF LINCOLN

PROGRAMME CO-ORDINATOR

Mr. Blake Conkle

2nd Street, Apartment 8, Vineland, Ontario

LARVICIDING

	Larvicide Used (Formulation)	Total Quantity Used (Product)	Total Area Treated	No. of Pools	Quantity of Pesticide Unused
1.	Abate 2G	22 lbs.	95	450	286 lbs.

Equipment Used — Portable Blower

Number of Pieces — 1

Cost — 25% of total $153.29

Small amounts of chemical were mostly hand applied.

Manpower Requirements	Man Hours	Number of Personnel
(1) Surveillance) (2) Actual Treatment)	580	2
(3) Total	580	2

Labour Cost $3,487.18

ADULTICIDING Yes _____ No X

TOTAL COST OF PROGRAMME: $4,188.71

COMMENTS: Breeding areas are now defined in Lincoln and it will be very easy to implement this programme if it is required in the future. 1976 results were very gratifying and only small amounts of chemical were required to kill all mosquito larvae.

THOROLD

PERMIT NUMBER W-P-2-011-76

PROGRAMME CO-ORDINATOR

J. Cruickshank

P.O. Box 1044, Thorold, Ontario

Phone Number Home 935-8145 Business 227-6613

LARVICIDING

	Larvicide Used (Formulation)	Total Quantity Used (Product)	Total Area Treated	No. of Pools	Quantity of Pesticide Unused
1.	Abate 2G	125 lbs.	8 acres		400 lbs.

Equipment Used Hand Spreader (Mechanical)

Number of Pieces 1

Cost $10.00

Manpower Requirements	Man Hours	Number of Personnel
(1) Surveillance	80	1
(2) Actual Treatment	40	1 (same man)
(3) Total	120	1

Labour Cost $420.00

ADULTICIDING Yes _____ No X

TOTAL COST OF PROGRAMME: $1,195.00

COMMENTS:

Training (Gross)	$ 145.00
Material (Gross)	320.00
Transportation	300.00

CITY OF NIAGARA FALLS

PERMIT NUMBER W-P-2-014-76

PROGRAMME CO-ORDINATOR

Nick Swec, Assistant Streets Superintendent

City of Niagara Falls, City Hall, 3200 Stanley Avenue, Niagara Falls, Ontario

Phone Number Home 295-4508 Business 356-1355

LARVICIDING

	Larvicide Used (Formulation)	Total Quantity Used (Product)	Total Area Treated	No. of Pools
1.	Abate 2G	176 lbs. product	Variable	83

Equipment Used Granular seeders, power duster

ADULTICIDING Yes ____ No x

COMMENTS:

Treatment of breeding sites started June 4th and ended September 9th. No treatments were made to private property. Most larviciding was made to roadside ditches where septic drainage caused ideal breeding sites for larvae development. Regular and heavy applications were made in Millar Park off Valiant Street, as yet an undeveloped City park where woodland pools and large ruts from construction traffic had very dense infestations of larvae.

CITY OF ST. CATHARINES

PERMIT NUMBER W-P-2-006-76

PROGRAMME CO-ORDINATOR

Jim E. Horton, City Engineering Department

P.O. Box 3012, St. Catharines, Ontario L2R 7C2

Phone Number Business 688-5600

LARVICIDING

	Larvicide Used (Formulation)	Total Quantity Used (Product)	Total Area Treated	No. of Pools	Quantity of Pesticide Unused
1.	Abate 2G	100 lbs.	35 acres	0	Nil

Equipment Used 1 Power Duster, 2 Hand Spreaders

Number of Pieces 3

Cost $535.50

Manpower Requirements	Man Hours	Number of Personnel
(1) Surveillance	225 hrs.	1
(2) Actual Treatment	30 hrs.	2
(3) Total	255 hrs.	3

Labour Cost $1,530.00

ADULTICIDING Yes _____ No X

TOTAL COST OF PROGRAMME: $ 800.00 (Material, Equipment, Training and Licencing)
1,530.00 (Labour)
$ 2,330.00 Total

COMMENTS:

Three separate applications were made during summer months. Municipal programme was effective, however, it only covered 10% of standing water. A better programme of public participation is required to provide any significant reduction in Culex species.

TOWNSHIP OF WAINFLEET

PERMIT NUMBER W-P-2-003-76

PROGRAMME CO-ORDINATOR

Phil S. Schertzing

R.R.#2, Port Colborne, Ontario

Phone Number Home 835-2650

LARVICIDING

	Larvicide Used (Formulation)	Total Quantity Used (Product)	Total Area Treated	No. of Pools	Quantity of Pesticide Unused
1.	Abate 2G	22 lbs.	7/10 acre	7	594 lbs.

Equipment Used and Number of Pieces: KWH 66D, (one); Hand Applicators, (six)

Manpower Requirements	Man Hours	Number of Personnel
(1) Surveillance	2 + Health Unit	2
(2) Actual Treatment	46½	2
(3) Total	48½	

Labour Cost $242.45

ADULTICIDING Yes _____ No X

TOTAL COST OF PROGRAMME: $690.03

TOWN OF FORT ERIE

PERMIT NUMBER W-P-2-010-76

PROGRAMME CO-ORDINATOR

Leo Roach, Town Hall

200 Jarvis Street, Fort Erie, Ontario L2A 2S6

Phone Number Business (416) 871-1600

LARVICIDING - Nil

ADULTICIDING Yes X No _____

Pesticide Used (Trade Name)	Methoxol 2.4-E
Formulation	10 to 1 with water
PCP Number	
Total Quantity Used	
How Applied (Equipment)	Roto Mist - John Bean towed by Case Tractor (two men)
Areas Treated	Ward 1, Ward 2, Ward 3
How Often Was Fogging Done	June 15th to Sept. 15th - daily (Mon.,Tues., Wed., Thurs., and Fri.)
Man Hours Involved	
Pesticide Cost	$ 3,150.00
Equipment Cost	
Labour Cost	$ 5,392.63

TOTAL COST OF PROGRAMME: $9,783.63

COMMENTS:

The Ward 1 area was sprayed more frequently to keep the "Caddis Fly" problem under control.

The ward 3 area along Lake Erie (Crystal Beach) was sprayed for Algae Control at a cost of $1,241.00 (carried out by private contractor.)

MINISTRY OF TRANSPORTATION AND COMMUNICATIONS (NIAGARA)

PROGRAMME CO-ORDINATOR

J. D. Nation

P. O. Box 5020, Burlington

Phone Number Business 527-9131

LARVICIDING

	Larvicide Used (Formulation)	Total Quantity Used (Product)	Total Area Treated	No. of Pools	Quantity of Pesticide Unused
1.	Tossit	15 cans		53	
2.	Abate	78 oz.			

Equipment Used 200 Gal. Sprayer

Number of Pieces 1

Cost Chemical Costs $ 268.35
Spraying Costs 1,065.00 (Labour)

Manpower Requirements	Man Hours	Number of Personnel
(1) Surveillance	354	1
(2) Actual Treatment	35½	1
(3) Total	389½	2

Labour Cost $2,146.00 Equipment Cost $765.00

ADULTICIDING Yes _____ No X

TOTAL COST OF PROGRAMME:

Hired Services Staff & Equipment	$ 1,065.00
Chemicals	268.35
Surveillance Equipment	765.00
Labour	2,146.00
Total	$ 4,244.35

COMMENTS:

Areas treated were ditches along the highways. No estimate of areas is available.

NIAGARA PENINSULA CONSERVATION AUTHORITY

P.O. Box 460, Forthill, Ontario L0S 1E0

PERMIT NUMBER W-P-2-013-76

PROGRAMME CO-ORDINATOR

James Manicom

35 Colonial Street, Welland, Ontario

Phone Number Home 732-6625 Business 892-2609

LARVICIDING

	Larvicide Used (Formulation)	Total Quantity Used (Product)	Total Area Treated	No. of Pools	Quantity of Pesticide Unused
1.	Abate 2G	66 lbs.	15 acres	38	1,934

Equipment Used Model 66-D Blowers; Respirators; Filters; Cartridges; Goggles; Gloves; Aprons.

Number of Pieces 2 Blowers; 4 each of other equipment for larviciding; 6 Dippers.

Cost $ 1,170.27

Manpower Requirements	Man Hours (Per Week)	Number of Personnel
(1) Surveillance	30	5
(2) Actual Treatment	4 34 x 10 weeks	5
(3) Total	340 hrs.	9

Labour Cost $1,445.76

ADULTICIDING Yes _____ No X

TOTAL COST OF PROGRAMME: $3,147.40

Total cost of programme does not include labour costs of one summer student who was paid out of Experience '76 Fund. She spent approximately three hours twice a week for ten weeks at a salary of $3.50 per hour. Therefore her labour cost was $210.00.

Many of our wet areas had dried up completely by June, which reduced our sampling area, except after a rainfall.

NIAGARA PARKS COMMISSION

PROGRAMME CO-ORDINATOR

Ross Wood

P.O. Box 150, Niagara Falls, Ontario L2E 6T2

Phone Number Business 356-2619

Larviciding

	Larvicide Used (Formulation)	Total Quantity Used (Product)	Total Area Treated	No. of Pools	Quantity of Pesticide Unused
1.	Abate 2G	66 lbs.	3 acres	11	154 lbs.

Equipment Used Hand operated cyclone seeder and truck

Number of Pieces 1 Unit

Cost Truck - 62 hrs. @ $5.00/hr. = $310.00

Material Cost 66 x 56 = $36.96 ÷ 4 = $9.24

Manpower Requirements	Man Hours	Number of Personnel
(1) Surveillance	31	2
(2) Actual Treatment	31	2
(3) Total	62	2

Labour Cost $724.16

ADULTICIDING Yes X No _____

Pesticide Used (Trade Name)	Malathion
Formulation	50 E.C.
PCP Number	
Total Quantity Used	3 pts.
How Applied (Equipment)	Mist Blower
Areas Treated	Par 3 Golf Course (21 acres)
How Often Was Misting Done	1
Man Hours Involved	6
Pesticide Cost	$3.96
Equipment Cost	3 hrs. (tractor & Mist Blower) $27.00
Labour Cost	$28.02

TOTAL COST OF PROGRAMME: $1,105.38

ONTARIO HYDRO (NIAGARA DISTRICT)

PERMIT NUMBER W-P-2-008-76

PROGRAMME CO-ORDINATOR

J. R. Vasey, Ontario Hydro

1053 Main Street West, Hamilton

Phone Number Business 529-7111

LARVICIDING

	Larvicide Used (Formulation)	Total Quantity Used (Product)	Total Area Treated	No. of Pools	Quantity of Pesticide Unused
1.	Abate 2G	88 lbs.	-	56	44 lbs.

Equipment Used Mist Blowers (66D Kem San Blowers)

Number of Pieces 2

Cost $ 832.00

Manpower Requirements	Man Hours	Number of Personnel
(1) Surveillance	252	1
(2) Actual Treatment	174	2
(3) Total	426	

Labour Cost $4,387.80

ADULTICIDING Yes _____ No X

TOTAL COST OF PROGRAMME: $7,000.00

COMMENTS:

The above costs do not include our costs for training, attending meetings, etc. We estimate our total cost at approximately $7,000.00.

MINISTRY OF NATURAL RESOURCES

PROGRAMME CO-ORDINATOR

R. Craig

P.O. Box 1070, Fonthill, Ontario

Phone Number Business 892-2656

LARVICIDING

	Larvicide Used (Formulation)	Total Quantity Used (Product)	Total Area Treated	No. of Pools	Quantity of Pesticide Unused
1	Abate 2G	10 lbs.	2 acres	3	122 lbs.

Equipment Used Cyclone Seeders, Respirators

Number of Pieces 3

Cost $150.00

Manpower Requirements	Man Hours	Number of Personnel
(1) Surveillance	300	3
(2) Actual Treatment	8	2
(3) Total		

Labour Cost $1,900.00

ADULTICIDING Yes _____ No X

TOTAL COST OF PROGRAMME: $2,400.00

NIAGARA REGIONAL HEALTH UNIT

PROGRAMME CO-ORDINATOR

E. G. Meyer, C.P.H.I.(C)

Niagara Regional Health Unit

Phone Number Business 685-1751

LARVICIDING

	Larvicide Used (Formulation)	Total Quantity Used (Product)	Total Area Treated	No. of Pools	Quantity of Pesticide Unused
1.	Tossit Capsules	972	4 acres	486	228
2.	Malathion	½ gallon	24 acres	11	

Equipment Used	dippers	boots
Number of Pieces	24	5 pairs
Cost	$50.16	$33.55 = $83.91

Manpower Requirements	Man Hours	Number of Personnel
(1) Surveillance)		
)	1,340	20
(2) Actual Treatment)		
(3) Total	1,340	

Labour Cost $11,668.90

ADULTICIDING Yes _____ No X

TOTAL COST OF PROGRAMME: to Health Unit - $11,752.81

COMMENTS:

Public Health Inspectors were involved with follow-up on complaints and routine inspections, assistance with programming, public education, administration of tossit capsules to areas where owners were not readily known and recommending or issuing order to drain or fill in areas in which water stagnates.

LINCOLN COUNTY BOARD OF EDUCATION

PROGRAMME CO-ORDINATOR

Howard Byford

69 Mountain Street, St.Catharines, Ontario

Phone Number Home 227-5909 Business 685-1551

LARVICIDING

	Larvicide Used (Formulation)	Total Quantity Used (Product)	Total Area Treated	No. of Pools	Quantity of Presticide Unused
1.	½ oz. per gal.	20 oz. Malathion	2000 sq. ft.	1	140 oz.

Equipment Used Pump Type Sprayer

Number of Pieces 1

Manpower Requirements	Man Hours	Number of Personnel
(1) Surveillance	8 hrs.	1
(2) Actual Treatment	8 hrs.	2
(3) Total		

Labour Cost $108.00

ADULTICIDING Yes _____ No X

TOTAL COST OF PROGRAMME: _____

COMMENTS:

We did not have a complete mosquito control programme arranged due mainly to a very late start in 1976.

The only problem that we encountered during the past season is the one listed above which was not a serious one according to the larvae count.

REGIONAL MUNICIPALITY OF HALTON

A central mosquito control co-ordinator for the four area municipalities (Burlington, Milton, Oakville and Halton Hills), the Halton Region Conservation Authority and the Regional Municipality of Halton property existed in the person of D. R. Morrier of the Department of Public Works, of the Regional Government. He purchased the larvicide on behalf of these six groups. Of the 3,000 pounds of Abate 2G initially purchased, only 101.48 pounds of product total was used over the summer to treat a total of 36.76 acres. Of the total cost of the mosquito abatement programmes in this area ($28,211), the largest proportion of this ($21,135) was for labour (5580 man-hours). Committee meetings were held regularly involving municipality personnel with the local Medical Officer of Health and representatives of the Ministry of Environment. Summaries of the individual programmes follow.

CITY OF BURLINGTON

PERMIT NUMBER W-P-3-020-76

PROGRAMME CO-ORDINATOR

R. C. Warren

City Hall, Cumberland Avenue, Burlington, Ontario

Phone Number Home 632-5137 Business 639-1837

LARVICIDING

Larvicide Used (Formulation)	Total Quantity Used (Product)	Total Area Treated
1. Abate 2G	25 lbs. product	8 acres

Equipment Cost $700.00

Manpower Requirements	Man Hours
(1) Surveillance)	
)	600
(2) Actual Treatment)	

Labour Cost $2,400.00

ADULTICIDING Yes _____ No X

TOTAL COST OF PROGRAMME: $4,000.00

COMMENTS:

Truck rental - $772.00

15 out of 58 mosquito larvae samples identified by MOE contract entomologists contained Culex pipiens.

TOWN OF HALTON HILLS

PERMIT NUMBER W-P-3-021-76

PROGRAMME CO-ORDINATOR

John P. Crawford

75 Pennington Crescent, Georgetown, Ontario

Phone Number Home 877-1453

LARVICIDING

	Larvicide Used (Formulation)	Total Quantity Used (Product)	Total Area Treated	No. of Pools	Quantity of Pesticide Unused
1.	Riddex Abate 2G	37 lbs.	532,975 sq.ft.	12	663 lbs.

Larvicide Cost 700 lbs. = $752.98

Equipment Used 1 can of insect repellent, 6 Cyclone Spreaders, 1 Water Dipper, 12 pairs P.U.C. Gloves, 9 pairs Safety glasses, 9 Safety hoods, 6 Respirators, 1 box of filters, 1 box of Chemical Cartridges, 2 Thermometers, Stationery Supplies, ½ gal. ethyl alcohol.

Equipment Cost $392.96

Truck Rental $348.60

Manpower Requirements	Man Hours	Number of Personnel
(1) Surveillance	N/A	3
(2) Actual Treatment	N/A	3
(3) Total	322 hours	3

ADULTICIDING Yes _____ No __X__

TOTAL COST OF PROGRAMME: $2,462.38

Further details are available from:

Mr. Dwayne Hay
Engineering Department
Town of Halton Hills
36 Main Street South
Halton Hills (Georgetown)
L7G 4XI

Phone No. 877-5185

MOSQUITO CONTROL PROGRAMME: HALTON HILLS

(Larvicide Spraying Chart)

Dates	Location	Area Sprayed (sq ft)	Used (lbs)	Used (grams)	Chemical Used
June 18/76	Remembrance Park Georgetown	14,375	1.5	681.75	Abate 2-G
June 25/76	Remembrance Park Georgetown	14,375	1.5	681.75	Abate 2-G
June 25/76	Fairview Cemetery Acton	125,000	8.0	3,636.00	Abate 2-G
June 25/76	Acton Fairy Lake	28,500	2.0	908.8	Abate 2-G
June 28/76	Fairview Cemeter Acton	125,000	8.0	3,636.0	Abate 2-G
July 20/76	Remembrance Park Georgetown	14,375	1.5	681.75	Abate 2-G
Aug. 6/76	Acton Fairy Lake	28,500	2.0	908.80	Abate 2-G
Aug. 6/76	Remembrance Park Georgetown	14,375	1.5	681.75	Abate 2-G
Aug. 6/76	Fairview Cemetery Acton	125,000	7.	3,181.50	Abate 2-G
Aug. 26/76	Remembrance Park Georgetown	14,375	1.5	681.75	Abate 2-G

MOSQUITO CONTROL PROGRAMME: HALTON HILLS

(Larvicide Spraying Chart)

Dates	Location	Area Sprayed (sq ft)	Used (lbs)	Used (grams)	Chemical Used
Aug. 26/76	Acton Fairy Lake	28,500	2.0	908.8	Abate 2-G
Aug. 27/76	146 Main St. S. Georgetown	600	.50	227.25	Abate 2-G

Total area sprayed = 532,975.00 sq. ft

Total amount of chemical used (lbs) = 37 lbs.

Total amount of chemical used (grams) = 16,815.90

TOWN OF OAKVILLE

PERMIT NUMBER W-P-3-014-76

PROGRAMME CO-ORDINATOR

F.C.B. Cannon

P.O. Box 310, Oakville, Ontario L6J 5A6

Phone Number Home 854-2586 Business 845-6601

LARVICIDING

	Larvicide Used (formulation)	Total Quantity Used (Product)	Total Area Treated	No. of Pools	Quantity of Pesticide Unused
1.	Abate 2G	9 lbs.	2.88 acres	20	See Comments

Larvicide Cost $0.59 per lb.

Equipment Used Cyclone Spreaders and Back Pack Blowers

Number of Pieces 12 Cyclone Spreaders, 3 Back Pack Blowers

Equipment Cost $1,400.00

Town vehicles used; therefore rental not charged.

Manpower Requirements	Man Hours	Number of Personnel
(1) Surveillance	1,908	4
(2) Actual Treatment	600	4
(3) Total	2,508	4

Labour Cost $10,000.00

ADULTICIDING Yes _____ No X

TOTAL COST OF PROGRAMME: $11,400.00

COMMENTS:

The Regional Municipality of Halton purchased 3,000 lbs. of pesticide for the four area municipalities, the Halton Region Conservation Authority and themselves.

All unused pesticide was returned to them by Oakville.

REGION OF HALTON

PERMIT NUMBER W-P-3-011-76

PROGRAMME CO-ORDINATOR

D. R. Morrier, Public Works Department

Regional Municipality of Halton, 3027 Harvestor Road,

Burlington, Ontario L7N 3G8

Phone Number Business 920-6945

LARVICIDING

	Larvicide Used (formulation)	Total Quantity Used (Product)	Total Area Treated	No. of Pools
1.	Abate 2G	15 lbs. Product		103

Equipment Cost $ 218.28

Truck Rental $1,202.56 (5,500 miles)

Safety Equipment $ 246.81

Manpower Requirements Man Hours

(1) Surveillance)
) 1,100
(2) Actual Treatment)

Labour Cost $4,400.00

ADULTICIDING Yes _____ No X

TOTAL COST OF PROGRAMME: $6,107.11

HALTON REGION CONSERVATION AUTHORITY

PERMIT NUMBER W-P-3-018-76

PROGRAMME CO-ORDINATOR

Robert Edmondson

H.R.C.A., 310 Main Street, Milton, Ontario

Phone Number Home 632-3907 Business 878-4131

LARVICIDING

	Larvicide Used (Formulation)	Total Quantity Used (Product)	Total Area Treated
1.	Abate 2G	2.98 lbs.	0.88 acres

Equipment Cost $218.00

Car Milage $50.80

Manpower Requirements	Man Hours
(1) Surveillance)	
)	110
(2) Actual Treatment)	

Labour Cost $558.95

ADULTICIDING Yes _____ No X

TOTAL COST OF PROGRAMME: $868.23

COMMENTS:

Of 16 mosquito larvae samples identified by MOE contract entomologists, 9 contained Culex pipiens.

TOWN OF MILTON

PROGRAMME CO-ORDINATOR

Bruce McKerr

Public Works Department, Milton, Ontario

Phone Number Business 878-7211

LARVICIDING

	Larvicide Used (formulation)	Total Quantity Used (Product)	Total Area Treated
1.	Abate 2G	20 lbs.	7 acres

Truck rental - $1,300.00 (4,000 miles)

Manpower Requirements	Man Hours
(1) Surveillance)	
)	880
(2) Actual Treatment)	

Labour Cost $2,640.00

ADULTICIDING Yes _____ No X

TOTAL COST OF PROGRAMME: $3,940.00

COMMENTS:

Of the 121 mosquito larvae identified by MOE contract entomologists, 14 were Culex pipiens.

REGIONAL MUNICIPALITY OF PEEL

PERMIT NUMBER W-P-3-012-76

PROGRAMME CO-ORDINATOR

Robert W. Cameron

PCO Services Limited, 232 Norseman Street, Toronto, Ontario

Phone Number Home 877-7074 Business 252-6411

LARVICIDING

	Larvicide Used (Formulation)	Total Quantity Used (Product)	Total Area Treated	No. of Pools	Quantity of Pesticide Unused
1.	Abate 4E	1 - 1.5 oz/Acre	186 treatments in 117,852 square feet of confirmed breeding sites on public lands *		
2.	Dursban 2½G				
3.	Abate 2G	4 lb. product/Acre			

Equipment Used cyclone seeder, power sprayer, compressor sprayer

Manpower Requirements	Man Hours	Number of Personnel
(1) Total	1970.5 (excludes Peel Health Unit involvement)	1 - 4 (highest number required at the end of July)

ADULTICIDING Yes _____ No X

TOTAL COST OF PROGRAMME: $58,513.45

COMMENTS: * Some private lands were also treated on a limited basis. At the request of homeowners, 254 private properties were monitored for the presence of larvae.

A total of 21,418 dip checks were made to confirm mosquito breeding activity in 1,865 locations. The programme commenced May 7th with treatment of woodland pools containing spring Aedes.

The Regional Municipality of Peel programme was conducted by PCO Services Limited, Toronto under the supervision of entomologist Robert W. Cameron through the co-ordination of Mr. Dave Dorman of the Peel Regional Health Unit, 100 Dundas Street West, Mississauga, L5B 1H6, telephone 453-6820.

Emphasis on the initial surveillance programme for potential mosquito breeding sites centered around the Town of Caledon, the City of Brampton and the City of Mississauga. Bolton, Clarkson and the Toronto International Airport were also checked. These areas were monitored regularly and treated with larvicide where necessary. Up to four treatments were necessary in ditches (mid-August to early September) where Culex and Aedes species of mosquitoes were found in combination. All mosquito identification was done by Mr. R. Cameron. Dr. D. Fowle of the Department of Biology, York University, undertook to evaluate residues of larvicides in treated pools in the Region.

No adulticiding was found to be necessary. Permanent marshes, such as Rattray Marsh, of concern to local naturalists, was monitored but not treated with pesticides; it has been found to produce spring Aedes mosquitoes (Aedes stimulans, Aedes excrucians and Aedes canadensis) in May as well as Culex restuans, Culex pipiens and Culex territans through the summer.

CITY OF TORONTO

PERMIT NUMBER W-P-3-003-76

PROGRAMME CO-ORDINATOR

Fred W. Ruf

100 Queen Street West, Toronto, Ontario

Phone Number Home 279-2475 Business 367-7463

LARVICIDING

	Larvicide Used (Formulation)	Total Quantity Used (Product)	Total Area Treated	No. of Pools	Quantity of Pesticide Unused
1.	Abate 2G	37 lbs.	9 acres	53	
2.	Pyrethrum Tossits	50 capsules	3-5,000 sq. ft.	33	
3.	Flit MLO	2 gals.			

Larvicide Cost $1,000.00

Equipment Used mechanical and manual spreaders

Number of Pieces 1 3

Equipment Cost $1,500.00

Manpower Requirements	Man Hours	Number of Personnel
(1) Surveillance	2500 - 3000	6
(2) Actual Treatment	35	2
(3) Total	approx 3000	

Labour Cost $16,444.00 (including clerical help)

ADULTICIDING Yes _____ No X

TOTAL COST OF PROGRAMME: $21,051.00

COMMENTS: The total labour costs represent all costs from staff inspectors to administrative staff time.

The City of Toronto began its initial surveillance of possible mosquito breeding sites April 15th. The responsibility for the programme was divided between the Departments of Parks and Recreation, Public Works and Public Health. Co-ordination of the programme was through Mr. F. Ruf of the Food Control and Sanitation Division and larviciding was done primarily by two trained and licensed Public Health Inspectors. A larger working pool, consisting of 10 licensed City Parks and Recreation personnel and 2 licensed Toronto Property Department employees, was available had the need for additional pesticide applicators been necessary. Eight Public Health students conducted the routine and post-treatment monitoring; one clerk answered inquiries, noted complaints and maintained records. The Department of Parks and Recreation, Property and Public Works also provided data on the preliminary mapping of potential breeding sites.

Initially, 150 sites were recorded and 25 more were added as the season progressed. Colour-coded pins were used to differentiate public, semi-public (Toronto Harbour Commission, Toronto Hydro, Toronto Transit Commission) and private areas. Monitoring of potential breeding sites comprised the largest part of the programme; permanent and semi-

permanent pools were monitored weekly and dry pools were checked monthly and after each rainfall to ensure that they had not become mosquito breeding sites. In total, 1,746 such inspections were made all on public property. Checking on inquiries and complaints with respect to private lands also was done but no larvicides were used in these cases.

Monitoring of Abate 2G treated pools showed that tadpoles were unaffected although 100% mortality of mosquito larvae was observed within 24 hours. Prior to the receipt of the Abate granular and equipment order, pyrethrin tossit capsules were used in some 33 isolated areas. Mortality was approximately 97% within 24 hours, with the 3% discrepancy probably due to the failure of one or two capsules to rupture. As well, Flit MLO was used where large pupae populations were found.

Mosquito larvae and adults (using a CDC light trap) from various locations over the summer were identified by entomologists with the Ministry of the Environment. Both Culex pipiens and Culex restuans were found in small numbers from July through September.

The need for public education in an urban area of this size was recognized early in the season particularly since the City programme did not encompass private lands. City of Toronto staff developed a handout pamphlet, on what the individual could do, which was printed and distributed in English and French and later in Greek, Chinese, Portuguese and Italian.

Media coverage included radio interviews and news messages broadcast over CFGM, CHUM (AM and FM), CFRB and CFTR. Global and CFTO news programmes carried film coverage of actual operations and CBC, CFTO and CICA (Channel 19) broadcast interviews and public service announcements. Articles in the three city newspapers also kept the public informed of the progress of the mosquito control programme.

BOROUGH OF YORK

PERMIT NUMBER W-P-3-004-76

PROGRAMME CO-ORDINATOR

G. D. Carroll, Department of Public Health

2700 Eglinton Avenue West, Toronto, Ontario

Phone Number Business 653-2700

LARVICIDING

	Larvicide Used (Formulation)	Total Quantity Used (Product)	Total Area Treated	No. of Pools	Quantity of Pesticide Unused
1.	Abate 2G	1 bag			5 bags
2.	Abate 4E	¼ gallons			3-3/4 gallons

Equipment Used: Trucks #69 and #94, respirator (2), cartridges (2), filters (1 box), gloves (4 pr.), seeder (1), spray gun (1), hose (1)

Cost: $139.21

Manpower Requirements	Man Hours	Number of Personnel
(1) Surveillance (2) Actual Treatment	132	2

Labour Cost: $861.21

ADULTICIDING Yes ____ No X

COMMENTS: The following areas were monitored and treated regularly throughout the spring and summer.

1. Borough of York Parkland

   Magwood Park between Pasadena Gardens and Humbercrest Blvd. south of St. Marks Road - approximately 7.5 acres of water and marsh.

2. Borough of York Parkland

   Bert Robinson Park, west side of Caledonia Road between Summit Avenue and Kitchener Avenue near C.P.R. rail (small ponds) monitored - no treatment required.

3. Borough of York Parkland

   Smythe Park, east of Scarlett Road - approximately 4 acres of water and marsh.

4. Borough of York Parkland

   Area behind Trethewey Park - approximately 1.5 acres marsh.

5. Borough of York Parkland

   Woodborough Park (small pond only).

6. Borough of York Water Course

   Black Creek area west of Hillsdale Road behind west sanitation yard - approximately 1.5 acres marsh.

7. Borough of York Land

   Low lying area north side of Industry Street and Trethewey Drive - approximately 2 acres marsh.

8. Cedarvale Area

   Under Glen Cedar Bridge - large tree holes (undetermined acreage).

9. Metro Property

Eglinton Avenue West, flats east of Jane Street - approximately 2.5 acres water.

10. Hydro Property

Hydro right-of-way on Woolner Avenue and area immediately west of Symes Road - approximately 5 acres marsh.

11. Board of Education Property

Area adjacent to Edmund Avenue - approximately 1 acre water.

12. Private Property (undetermined acreage)

(a) Lambton Golf Course on Scarlett Road - approximately 1 acre water.
(b) Northwestern General Hospital
(c) Levy Auto Parts on Weston Road
(d) St. Michael's College
(e) Unused swimming pool on Pendeen Avenue

The Board of Health costs only were as follows:

Equipment	$139.21
Education	279.50
Licenses	20.00
Materials	452.20
Miscellaneous	4.00
	$894.91

The Parks Department labour amounted to $861.21

The labour cost for two health inspectors was not taken into account.

Total costs:	$ 894.91	as above
	861.21	Parks Department labour only
	$1,756.12	

BOROUGH OF ETOBICOKE

PERMIT NUMBER W-P-3-007-76

PROGRAMME CO-ORDINATOR

Don Sadler

Civic Centre, Etobicoke, Ontario M9C 2Y2

Phone Number Home 453-8737 Business 677-3118

LARVICIDING

	Larvicide Used (Formulation)	Total Quantity Used (Product)	Total Area Treated	No. of Pools	Quantity of Pesticide Unused
1.	Abate 4E	2½ gals.		220	½ gal.
2.	Tossit capsules	6 cans, 40 capsules each		120	0

Larvicide Cost $282.96

Equipment Used Backpack sprayer (mister)

Number of Pieces 1

Equipment Cost $362.80

Manpower Requirements	Man Hours	Number of Personnel
(1) Surveillance	595	13
(2) Actual Treatment	791	2
(3) Total	1386	15

ADULTICIDING Yes _____ No X

TOTAL COST OF PROGRAMME: $13,337.98

COMMENTS: A portion of the final report prepared by Mr. Sadler has been included, as an example of the excellence that can be achieved in preparation and execution of a thorough mosquito surveillance and larviciding programme. Additional details can be obtained by contacting the Borough.

With the concern for a possible outbreak of St. Louis Encephalitis in southern Ontario, the Ministry of the Environment urged southern Ontario municipalities to adopt a Mosquito Control Programme to reduce the mosquito population and thus reduce the chance of an outbreak of St. Louis Encephalitis.

To assist the Ministry in accomplishing their task the Borough of Etobicoke initiated a programme of mosquito control utilizing the Parks Section of the Parks and Recreation Services Department and the Community Health Department. The Parks Section provided the applications and the Health Department monitored the breeding sites throughout the Borough.

FIRST STEP:

Frank Purkis, and myself (Don Sadler) undertook a training course and examination for an operator's licence Class 04 to operate an extermination business. This was done in order to allow spraying of private property. The operator's licences are held by the Corporation of the Borough of Etobicoke and the required insurance policies were applied for and granted at that time under permit (w-p-3-007-76).

SECOND STEP:

After careful consideration it was decided to use Abate 4E and Tossit capsules for larviciding of mosquitoes which met with the approval of the Ministry of the Environment. The applicators were trained on application methods and safe application procedures. There were two parks employees designated for these tasks. No Adulticiding Programme was used.

THIRD STEP:

An aerial photograph was taken of the Borough of Etobicoke and from it an on-site inspection was made. From this site inspection 220 sites were plotted on the map. A description of location was then recorded. These sites were numbered from 1 to 220 and 23 new sites were added after the mosquito programme was started. These new sites were numbered as follows (75.1 or 154.1) whichever original pond was closest. This survey was completed April 26th, 1976.

These sites were classified as A, B, and C Ponds.

A Pond - being of permanent nature which is expected to retain water for the duration of the season.

B Pond - being of temporary nature appearing after a snow-melt or heavy rainfall.

C Pond - being flood plain areas where marshy conditions exist during high water in creeks and rivers.

STEP FOUR:

Discussions took place between myself and the Community Health Department and it was agreed that Mr. Albert Cheng would co-ordinate the inspection of possible breeding sites located on the Borough map. The Community Health Department agreed to use 11 District Health Inspectors to monitor the ponds in their respective district. A serial number was alloted to each survey report where district one starts with 1/01, etc.

STEP FIVE:

Survey reports and Action Slips were drawn up and procedures for their use were decided as follows:

Survey Report Form (see attached A-1)

Each form was used for one particular breeding site. This form was to be completed in duplicate. The original was kept in the office and the copy was retained by Parks Maintenance Section.

Action Slip (see attached A-2)

Was used for inter-office correspondence and recording of inspection and application.

MOSQUITO ABATEMENT SUMMARIES

	District #											
	1	2	3	4	5	6	7	8	9	10	11	Total
No. of Sites Visited	82	13	32	13	34	25	31	32	9	14	3	288
No. of Inspections	647	217	591	198	446	246	386	341	119	238	33	3462
No. of Treatments	174	15	46	10	23	10	8	18	10	12	3	329
No. of Sites Treated	51	10	19	8	9	3	8	8	7	9	2	134

Manpower and Costs

Health Department

A - Number of hours spent on Inspection	43.2 hours
Number of Inspectors	11
Cost per hour	$9.00

Total inspector's cost = 11 x 43.2 x $9.00 = $4,076.80

B - Supervisor

Number of supervisors	1
Number of hours spent	60 hours
Cost per hour	$10.00
Total Supervisor's cost	$600.00

C - Clerical Staff

Number of Clerks	1
Number of hours spent	60 hours
Cost per hour	$5.00
Total Clerical cost	$300.00

Parks Maintenance

Number of Foremen	1
Cost per hour	$6.34
Number of regular hours	380
Number of overtime hours	120
Total Cost	$3550.40
Number of Labourers	1
Cost per hour	$6.00
Number of regular hours	246
Number of overtime hours	45
Total Cost	$1891.00
Total Manpower Costs	$10,418.20

Materials and Costs

3 gals. Riddex Abate 4E	$212.40
6 cans Tossit Capsules	$70.56
SubTotal	$282.96

A1

BOROUGH OF ETOBICOKE

DATE _____

DISTRICT # _____

SITE LOCATION

MAP SECTION: _____

PROPERTY:-
FEDERAL PROVINCIAL
PRIVATE BOROUGH
METRO

TYPE OF POOL
(circle applicable)
A = Permanent
B = Temporary
C = Flooded
Depth _____ inches
Swamp Area
Woodland Pool
Ditch
Wheel Tracks
Vacant Lot
Construction Site
Depressed Grassy Area
Yard
Roof
Other (please state)

Larvae Counts	No. of Dips	Average Larvae	Stage of Development	WEATHER CONDITIONS Temp.	Sunny	Cloudy	Wind Speed	Direction

DATE OF TREATMENT	AMOUNT OF CHEMICAL

RECHECKS

DATES									
NO. OF DIPS									
LARVAE PRESENT									
PRE-TREATMENT									
POST-TREATMENT									
MORTALITY %									

ACTION TAKEN

1. Referred to Parks/Works Dept. for information and any action they deem necessary
2. Educational talk re mosquito control given to occupants of the premises at:
   _____
3. Samples collected and sent to Entomologist for identification.
4. Dealt with by direct action:- ___ Tossitt capsules applied.
5. Others (please state) _____

SHAPE	BOTTOM
Long	Leaves
Narrow	Grass
Round	Sand
Tiny	Clay
Irregular	Organic
	Cement
WATER	TOTAL AREA (Approx.) in square feet
Clear	
Coloured	
Organic	_____

REMARKS

_____

_____

_____

TIME DEVOTED: _____ hrs.

PUBLIC HEALTH INSPECTOR, C.P.H.I.(C)

A2

MOSQUITO CONTROL

SERIAL # _____

MAP SECTION _____

SITE LOCATION _____

_____

_____

DATE LARVAE COUNTS/CHECKS _____

LARVAE DEVELOPMENT

1st 2nd 3rd or 4th stage

TEMPERATURE _____

DATE OF TREATMENT _____

TEMPERATURE _____

AMOUNT OF CHEMICAL _____

BREEDING PLACE WAS TREATED

WITH ____ TOSSITT CAPSULES

REMARKS: _____

_____

_____

_____

_____

_____

Manpower and Costs cont'd

Equipment

1 Portable Back Pack Mist Blower	$362.80
12 Stainless Steel Ladles	$82.03
1 3/4 ton Truck, 120 days x $16	$1920.00
2 Gas Cans	$12.40
1 Pr. Hip Waders	$14.50
1 Rain Suit	$14.40
3 Face Mask Respirators	$22.35
6 Pr. Rubber Gloves	$14.70
SubTotal	$2443.18

Licences	$35.00
Insurance	$441.60
TOTAL OVERALL COST	$13,337.98

SCARBOROUGH

PERMIT NUMBER W-P-3-008-76

PROGRAMME CO-ORDINATOR

E. Stewart

150 Borough Drive, Scarborough, Ontario

Phone Number Home 439-1436 Business 438-7434

LARVICIDING

Larvicide Used (Formulation)	Total Quantity Used (Product)	Total Area Treated	No. of Pools	Quantity of Pesticide Unused
1. Abate 2G	120 lbs.	20 acres	98 - Borough property - Private " - Ont.Hydro "	69 28 1
2. Flit MLO	3.5 gals.	3 acres	10	

Equipment Used Cyclone spreader, Boots, Masks, Overalls, Dippers, Head covers, Light trap (Loaned by M.O.E.)

Manpower Requirements	Man Hours	Number of Personnel
(1) Surveillance	2796	21
(2) Actual Treatment	400	4
(3) Total	3196	25

Labour Cost $8,000.00

ADULTICIDING Yes_____ No x

TOTAL COST OF PROGRAMME: $13,618.84

COMMENTS:

Twenty-one employees of the Borough of Scarborough Parks Works and Health Departments attended mosquito tutorial and examination sessions held by the Ministry of Environment; most of these employees had previous pesticide application experience. Information on breeding sites was provided by Works and Parks Departments Foremen, Health Inspectors, Weed Inspectors and interested citizens; a newspaper advertisement was published informing residents about the mosquito control programme and requesting their co-operation in eliminating any potential breeding areas. The Borough was divided into small monitoring units. On maps of scale of 1 inch = 1000 feet potential sites were colour coded as to: (1) permanent ponds, (2) temporary pools, (3) permanent marshy areas, and (4) creeks and drainage ditches. Locations of new pools and disappearance of old pools were noted as the season progressed. When significant larvae activity was observed or more than 10 larvae per dip were found, a 'Request for Treatment' form was completed and delivered by the surveyor to the Works or Park Department for treatment the next day. These sites were marked by the surveyor for treatment by the pesticide applicator and re-inspected with 24 to 48 hours by the surveyor for efficacy. Flit MLO was used where the larvae were found to have pupated and Abate would no longer work.

Each known site was inspected once per week. Ten flat school roofs were surveyed but no larvae were found. Catch basins were monitored throughout the summer and no infestations were found. Approximately 150 private property sites were inspected following

complaints; twenty-seven of these were treated. Culex species of mosquitoes were found among those samples submitted to H. Goble for identification from June 16th to August 10th.

Problems occurred when surveyors identified substantial numbers of 4th instar larvae in an area and were not prepared to treat on the spot. Response on mosquito identification also was not as prompt as was desired. A full report on the Borough's activities is available from the Works Department.

BOROUGH OF NORTH YORK, PUBLIC WORKS DEPT.

PERMIT NUMBER W-P-3-009-76

PROGRAMME CO-ORDINATOR

John M. Skinner

5000 Yonge Street, Willowdale, Ontario M2N 5V7

Phone Number Home 493-6051 Business 225-4611 (Local 388)

LARVICIDING

	Larvicide Used (Formulation)	Total Quantity Used (product)	Total Area Treated	No. of Pools	Quantity of Pesticide Unused
1.	Abate 2G	160 lbs.	(see comments)		4,840 lbs.

Larvicide Cost Total - $3,185.68 Actually used - $107.20

Equipment Used Cyclone spreaders and dippers

Number of Pieces 11 of each

Equipment Cost $209.80

Manpower Requirements	Man Hours	Number of Personnel
(1) Surveillance	3,912	26
(2) Actual Treatment	1,191	15
(3) Total	5,103	26

Labour Cost - For surveillance & Treatment - $28,445.65
Total - 31,712.52

ADULTICIDING Yes _____ No X

TOTAL COST OF PROGRAMME: $40,376.34

COMMENTS:

Most of the mosquito larvae found in North York this year were in road culverts and ditches, thus it is very difficult to calculate the total area covered. Any ponds that were treated were very small in size, therefore, this area would be about one acre only. This is the reason for the small amount of larvicide used. The total number of people engaged in the programme was 26, however, 11 of these were supervisory and did not do actual treatment work.

The total labour cost reflects the labour costs charged to the programme as a whole. This would include the labour required to remodel a storage area for chemical storage.

Eleven employees of the Borough of North York, from the Public Health Department (4), Department of Public Works (4) and the Parks and Recreation Department (3) were trained and licenced as water class 3 exterminators for use of Abate 2G. Two also obtained an operator's class 4 licence and two obtained land class 10 exterminator's licence (endorsed for use of Baygon and Malathion as mosquito adulticide). Only the Abate granular was actually used in the programme. Post treatment checks confirmed excellent larval kills.

Surveillance commenced late June and therefore could not include woodland breeding sites of spring Aedes mosquitoes as these pests were already present as adults. Summer habitats were checked; driveway culverts proved to be prime breeding sites for summer species. Insect species identified from various sites included Aedes vexans, Culex pipiens, Culex restuans, Anopheles walkeri, Anopheles quadrimaculatus, Culiseta morsitans, Psorphora ciliata, and Mansonia perturbans.

It was anticipated early May that between 200 and 500 acres of stagnant water areas within the Borough (66 square miles) would have to be treated. The actual area of breeding sites located and treated was very much smaller; a total of 160 pounds of Abate 2G was used.

The sampling programme was carried out by two crews from the Public Works Department, augmented from time to time by Parks Department crews. At the close of the programme (Sept. 17), the Works Department suggested that an improvement for a more comprehensive future programme would be the expansion of field crews to four and an earlier starting date of the programme (April).

TORONTO HARBOUR COMMISSION

PERMIT NUMBER W-P-3-010-76

PROGRAMME CO-ORDINATOR

Edward C. Bell

60 Harbour Street, Toronto, Ontario M5J IB7

Phone Number Home 438-8985 Business 863-2119

LARVICIDING

Larvicide Used (Formulation)	Total Quantity Used (Product)	Total Area Treated	No. of Pools	Quantity of Pesticide Unused
1. Abate 2G	25 lbs.	21,958 sq.ft.	30	

ADULTICIDING Yes _____ No X

COMMENTS:

A total of 30 ponds were mapped and monitored, beginning on April 23 and continuing on a weekly basis through to September 21. Of the 30 ponds monitored, a total of 12 were found to contain mosquito larvae.

With two exceptions, all ponds treated were tested the following day. In these two cases, they were tested within 48 hours. All follow up testing showed a maximum kill.

A total of approximately 25 lbs. of ABATE 2G was used in treating the mosquito larvae.

Area	Date Tested	Date Sprayed	Size
Pond #5 Island Airport	July 9	July 9	150 sq. ft.
Pond #6 Island Airport	Aug. 5	Aug. 5	5 sq. ft.
Pond #6A Island Airport	Aug. 4	Aug. 5	3,500 sq. ft.
Pond #11A Leslie Landfill	June 30	July 1	250 sq. ft.
Pond #11A Leslie Landfill	July 6	July 7	2,500 sq. ft.
Pond #11B Leslie Landfill	July 6	July 7	500 sq. ft.
Pond #11B Leslie Landfill	Aug. 3	Aug. 4	400 sq. ft.
Pond #12 Unwin Ave. East of R.L. Hearn	July 6	July 7	5,000 sq. ft.
Pond #13 Leslie Landfill	June 29	June 30	2 acres
Pond #13 Leslie Landfill	July 7	July 7	600 sq. ft.
Pond #13 Leslie Landfill	Aug. 3	Aug. 4	3,000 sq. ft.
Pond #13C Leslie Landfill	July 13	July 14	10 sq. ft.
Pond #13C Leslie Landfill	Aug. 3	Aug. 4	800 sq. ft.
Pond #13D Leslie Landfill	July 1	July 1	2,000 sq. ft.
Pond #20 Commissioners St. East of Shell Co.	June 29	June 30	300 sq. ft.
Pond #21 Commissioners St. East of Shell Co.	June 29	June 30	1 acre
Pond #21 Commissioners St. East of Shell Co.	July 6	July 7	2,000 sq. ft.
Pond #21 Commissioners St. East of Shell Co.	Aug. 3	Aug. 4	25 sq. ft.
Pond #21 Commissioners St. East of Shell Co.	Sept. 20	Sept. 21	5 sq. ft.
Pond #22 Leslie Landfill	July 13	July 14	300 sq. ft.
Pond #22 Leslie Landfill	July 30	July 30	300 sq. ft.
Pond #22 Leslie Landfill	Aug. 23	Aug. 24	300 sq. ft.
Pond #22 Leslie Landfill	Aug. 30	Sept. 1	10 sq. ft.

METROPOLITAN TORONTO PARKS DEPARTMENT

PERMIT NUMBER W-P-3-015-76

PROGRAMME CO-ORDINATOR

B. Fedak

12th Floor, 439 University Avenue, Toronto, Ontario

Phone Number Home 438-7054 Business 367-8182

LARVICIDING

Larvicide Used (Formulation)	Total Quantity Used (Product)	Total Area Treated	No. of Pools	Quantity of Pesticide Unused
1. Abate 2G	103 lbs.	120 treatments to catch basins, wheel tracks and small ponds		3,757 lbs.

Larvicide Cost 4,178.08

Equipment Used Mostly by hand shaker and some by cyclone spreader

Number of Pieces 25 cyclone spreaders were purchased

Equipment Cost $508.25

Manpower Requirements	Man Hours	Number of Personnel
(1) Surveillance		24
(2) Actual Treatment		7

(3) Total - personnel who were on surveillance also took part in the treatment

ADULTICIDING Yes _____ No x

TOTAL COST OF PROGRAMME: $17,086.51

COMMENTS:

Please note that the full cost of the material has been included in the total cost of the programme, even though only 103 pounds were used. Included in this cost were some Tossit capsules which were not used.

The Metropolitan Toronto Parks Department surveyed, mapped and monitored potential breeding sites in all the parks under their jurisdiction, both permanent water sites and pools flooded after rainfall. Monitoring commenced the third week of May. Larvae mortality was monitored post-treatment to check larvicide efficacy. Treatment of Abate 2G at 4-6 lbs product/acre was made when 10 larvae+/dip were found.

Location	Dates Treated
Scarlett Woods Golf Course	pool #2 (once) pool #4 (once) pool #3 (twice)
Don Valley Golf Course	pool #1 (July 28, Sept.13) pool #2 (August 17)
Tam O'Shanter Golf Course	wheel tracks (July 28, Aug. 24)
Western Division	
1. Etienne Brule Park	pool #1 (June 29, August 31) pool #2 (June 22, July 7,August 4) pool #3 (June 29) pool #4 (June 29)
2. Eglinton Flats (S.E. quadrant)	pool #2 (June 23)
3. Eglinton Flats (N.W. quadrant)	(August 11, August 18)
4. Marie Curtis Park	pool #2 (August 18, August 31) pool #3 (July 7, July 22, August 4, September 8)

5.	Lambton Mills	pool #3 (June 24, July 6, August 18, September 7) pool #4 (June 24, August 11, August 25)
6.	Scarlett Mills Park	pool #2 (June 28, July 22, August 25)
7.	Humber Marshes	pool #1 (June 23, July 8, July 26, August 3, August 27, September 9) [wheel tracks]
8.	King's Mill Area - Humber Marshes	pool #5 (July 8, July 15, July 26, August 17, August 23, August 31)

Central Division

1.	Warden Woods	pool #3 (August 9, August 16) pool #5 (August 9, August 16) pool #6 (August 9, August 16)
2.	Edwards Gardens - Wilket Creek	pool #1A (July 24) pool #5A (July 6) pool #5B (July 6) pool #8 (July 6) pool #9 (July 6) pool #10 (July 6)
3.	Don Valley Parkway - Don Mills Road Area	pool #1 (August 4, August 24) pool #2 (August 4)
4.	Taylor Creek Park - (Plan 72)	pool #2 (August 17) pool #8 (September 8) pool #9 (August 8)
5.	Taylor Creek Park - (Plan 73)	(August 4, August 8, September 3)
6.	Taylor Creek Park - (Plan 71W)	pool #1 (August 11) pool #4 (August 4, August 11) pool #5 (August 19) culvert (August 17)
7.	Sunnybrook Park	pool #6 (July 8, August 17) pool #7 (July 8, August 17, September 9, September 14) pool #8 (July 8, July 15, July 26, August 3) pool #10 (August 3, August 17, August 25)
8.	Seton Park	pool #1 (September 3) pool #3 (July 15) pool #6 (July 8)

Eastern Division

1.	North Colonel Danforth Area	no mosquito larvae were found; no larvicide was used
2.	Highland Creek Park - (Morningside Area)	pool #1 (July 9, August 21) pool #2 (August 21) pool #5 (July 9, August 21)
3.	North of Highland Creek - West of Morningside Avenue	pool #1 (July 9, August 21) pool #2 (July 9, August 21)
4.	Highway #401 and Rouge River	pool #2 (August 20)
5.	Colonel Danforth Park - south of Lawrence Avenue East	no mosquito larvae were found; no larvicide was used.

Toronto Island: Monitoring commenced May 21 and concluded September 3. Insufficient numbers of larvae were found at any time during the season; therefore treatment was not justified.

Northern Division

1.	G. Ross Lord Park	isolated ditches and wheel tracks were treated once, then filled in.
2.	Downsview Dells	catch basins (July 5, September 4) pool #5 (July 5, August 3, August 16) pool #7 (July 8, July 12, August 16) pool #3, 4, 8 (July and August)
3.	Rowntree Mills Park	10 catch basins (July 2) pool #1 (August 16, August 25) pool #2 (June 24, July 2, July 12, August 16, September 3)
4.	Thistletown Area	no mosquito larvae were found; no larvicide was used
5.	Plan #1N (pools were not connected to any designated park)	wheel tracks, ditch, 4 rainbarrels and three ponds were treated
6.	Newtonbrook Ravine	wheel tracks (July 8, August 3)
7.	Willowdale Dam	wheel tracks (June 23, August 9) pool #4 (August 25, September 14) pool #5 (August 10, September 9)

METROPOLITAN TORONTO WORKS DEPARTMENT

PERMIT NUMBER W-P-3-013-76

PROGRAMME CO-ORDINATOR

G. M. Desjardins

439 University Avenue, 10th Floor, Phoenix House, Toronto, Ontario

Phone Home 755-6721 Business 367-8222

LARVICIDING

Larvicide Used (Formulation)	Total Quantity Used (Product)	Total Area Treated	No. of Pools	Quantity of Pesticide Unused
1. Abate 2G	33 lbs.	28.5 acres	58	1428 lbs.

Larvicide Cost $1,142.31

Equipment Used Seed spreaders, dippers, rubber gloves, respirators

Number of Pieces Approximately 6 each

Equipment Cost $584.38

Manpower Requirements	Man Hours	Number of Personnel
(1) Surveillance	Not recorded	6
(2) Actual Treatment	"	6
(3) Total	1,700	6

Labour Cost - $10,301.86

ADULTICIDING Yes _____ No x

TOTAL COST OF PROGRAMME: $12,148.55

ORILLIA

PERMIT NUMBER W-P-3-002-76

PROGRAMME CO-ORDINATOR

Elmore W. Peel, Superintendent, Works Department

20 James Street West, P.O. Box 340, Orillia

Phone Number Home 325-7847 Business 325-1311 Ext. 63

LARVICIDING

Larvicide Used (Formulation)	Total Quantity Used (Product)	Total Area Treated	No. of Pools	Quantity of Pesticide Unused
1. Abate 2G (mostly)	316 lbs.	130 acres	~30-35	198 lbs. product
2. Abate 4E		(multiple treatments in some cases)		

Equipment Used Granular seeders, back pack, (motorized back pack was not used)

Number of Pieces 2/3 in stock were used 1/2 in stock were used

Manpower Requirements	Man Hours	Number of Personnel
(1) Surveillance and Post Treatment Checks	1/4 of total hours	3
(2) Actual Treatment	3/4 of total time	3
(3) Total	373 man hours	3

ADULTICIDING Yes___ No x

TOTAL COST OF PROGRAMME: $ 3,500.00

Most of the activity in mosquito control in Orillia centres around control of the spring Aedes species. Previous history of mosquito control in Orillia may be found in the Ministry of Environment Control 1974 and 1975 reports. City staff started to monitor pools for the presence of larvae starting March 30th (as compared to April 29th in 1975). Treatment in 1976 commenced mid April and largely was completed by May 13th except where a few confirmed breeding sites were found producing Aedes vexans. Since the largest percentage of viable breeding sites of the spring and summer nuisance species are known and had been previously recorded, most of the manpower requirements were involved in actual treatment time. Because 1976 was a drier spring than 1975, total area treated in 1976 was 10% less than 1975. One staff member was involved in monitoring sites and making post treatment larvae mortality checks following the spray crews.

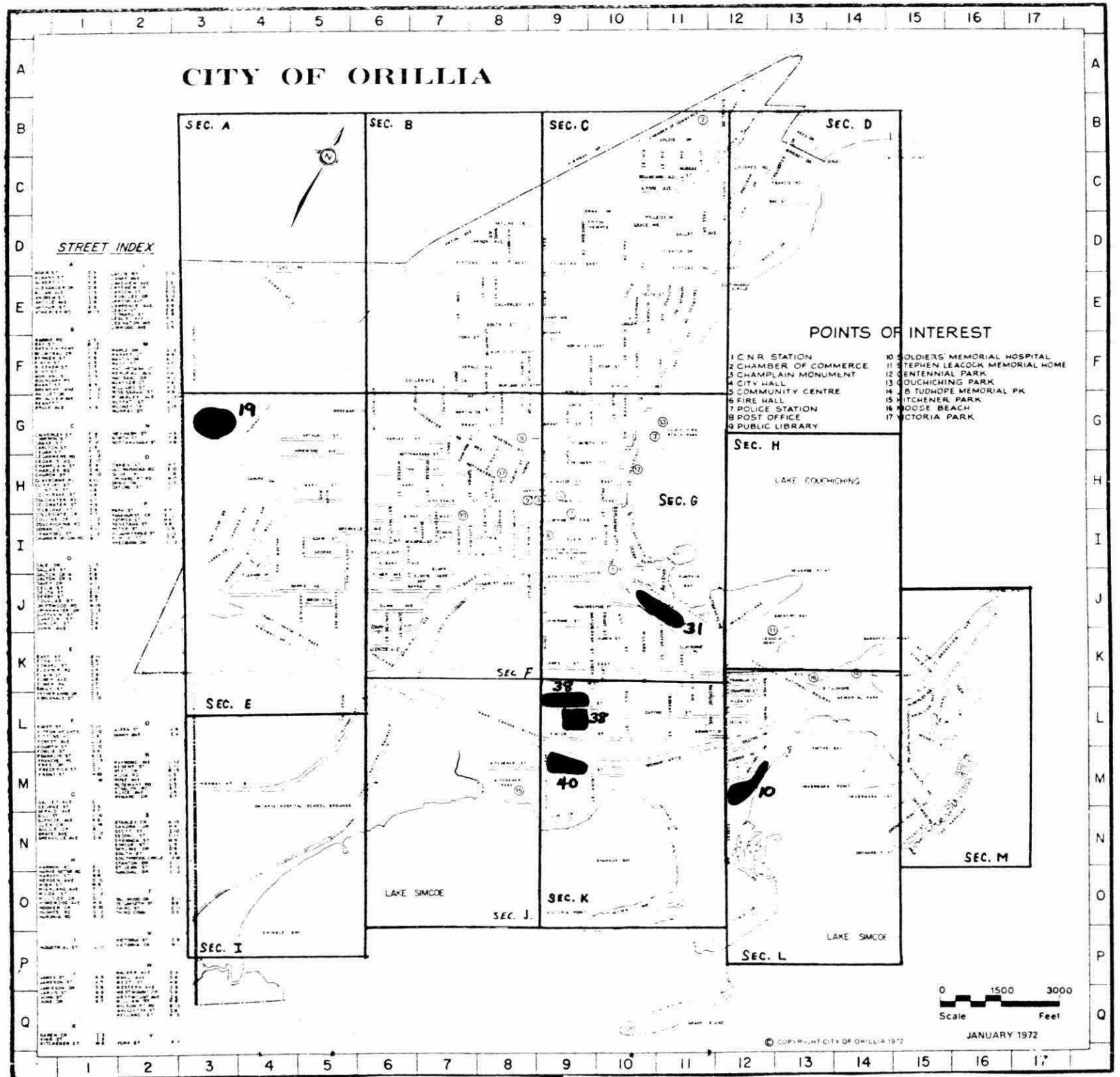
Activities in reducing mosquito breeding sites through filling in or building drainage canals and ditching systems where possible was continued in 1976.

The Orillia mosquito control programme is now a well established routine (subject to weather conditions and fluctuating mosquito populations) but surveillance continues for new breeding sites such as in the north-eastern section of the City where spring Aedes have not been previously found. Problems such as treating for larvae in a 5 acre brush area on the north-western boundary of the City where ground access is much restricted still exists. Since such sites as this may produce nuisance adult populations that could move with prevailing winds into residential areas, they are not being ignored.

Selected breeding sites were again monitored for larvae production (Figure 1, Table 1) and larvicide residues (Table 2). Pesticide residue analysis was kindly provided by Dr. R. Frank and staff of the Provincial Pesticide Residue Testing Laboratory, Guelph.

Figure 1

Abate Residue Sampling Locations
April, 1976



POOL DESCRIPTION

	April 23 (noon - 2 P.M.)	April 29 (2.30 - 4.30 P.M.)	April 30 (1.30 P.M.)
E 19	- 6 per dip - half pupae, half 4th instar - water 18°C	Not sampled	Not sampled
G 31	- 1 per dip - 3rd and 4th instar - Water 15°C	- No larvae or pupae found - Water 17°C	Not sampled
K 38	- No larvae or pupae found - Water 15°C	- No larvae or pupae found - Water 15.5°C	Not sampled
L 10	- 6 per dip - 2nd and 3rd instar - Water 11.5°C	Not sampled	Not sampled
K 40	- Not sampled	K 40A - 9 larvae/dip - 3rd instar - Water 15°C	K 40B -No larvae or pupae found -Water 13°C
Weather	Sunny 45-50° F 10-15 mph winds	Sunny 60° F Windy	Sunny 61° F 0-5 mph wind

ABATE RESIDUES (ppm)

Site	Treatment Date	Residues: Apr. 23 Water	Sediment	Apr. 29 Water	Sediment	Apr. 30 Water	Sediment
E 19	Not treated (approx-imately 30 acres)	ND*	a ND	Not sampled		Not sampled	
		TR**	b ND				
		ND	c ND				
		TR	d ND				
G 31	April 22	ND	a ND	ND	a ND	Not sampled	
		ND	b ND	TR	b ND		
		ND	c ND	TR	c ND		
		ND	d ND	TR	d ND		
K 38	April 21	ND	a 0.36	ND	a ND	Not sampled	
		ND	b 0.45	.001	b ND		
		ND	c 0.52	ND	c ND		
		ND	d 1.3	.001	d ND		
L 10	Not treated	ND	a ND	Not sampled		Not sampled	
		ND	d ND				
		ND	c ND				
		ND	d ND				
K 40	April 29						
	K 40A	Not sampled		ND	a ND	Not sampled	
				.002	b ND		
				ND	c ND		
				.002	d ND		
	K 40B	Not sampled		Not sampled		ND	a ND
						ND	b ND
						ND	c ND
						ND	d ND
K 40A and K 40B are two ends of the same breeding pool							

* ND means not detectable
** TR means trace

a Abate (parent form)
b Abate Sulfone
c Abate Sulfoxide
d Total Abate (a+b+c)

Limits of detection: a in water, .001 ppm; in sediment, .01 ppm
b,c in water, .0005 ppm (.5 ppb); in sediment, .005 ppm

MARA TOWNSHIP

In 1975, Abate 2G was applied by helicopter at a rate of 3 pounds product per acre over 2,340 acres under favourable weather conditions, May 14, 15 and 17th. Details of this programme may be found in the Ministry of Environment's Report "Mosquito Control 1975".

In 1976, the rate of product Abate 2G was increased to four pounds product per acre due to the problem of penetration of the granules through the dense wood brush in spite of the lack of leaf canopy at the time of treatment.

Inspection of ground sites for presence of mosquito larvae by Mara Township staff started March 30th, 1976. By April 19th, in some open spots, larvae had advanced to the fourth instar stage and ground manual seeding of those breeding sites started April 20th. Four bags of granular product total were ground-seeded. Aerial treatment started the evening of April 23rd and April 24th; 2600 pounds abate 2G was applied over those two nights. The remainder of the treatment sites were treated April 30th and May 1st. A total amount of 11,800 pounds Abate 2G was used.

Construction activities at Lagoon City had not appreciably reduced the extent of mosquito breeding sites requiring treatment but drainage was being improved because of presence of a new canal.

Several sites (Figure 1) were monitored for presence of mosquito larvae, larvicide residue and larval mortality following treatment. Analyses of residues were provided by Dr. R. Frank, Provincial Pesticide Residue Testing Laboratory and are recorded in Table 2.

Figure 1

ABATE RESIDUE SAMPLING SITES APRIL 1976

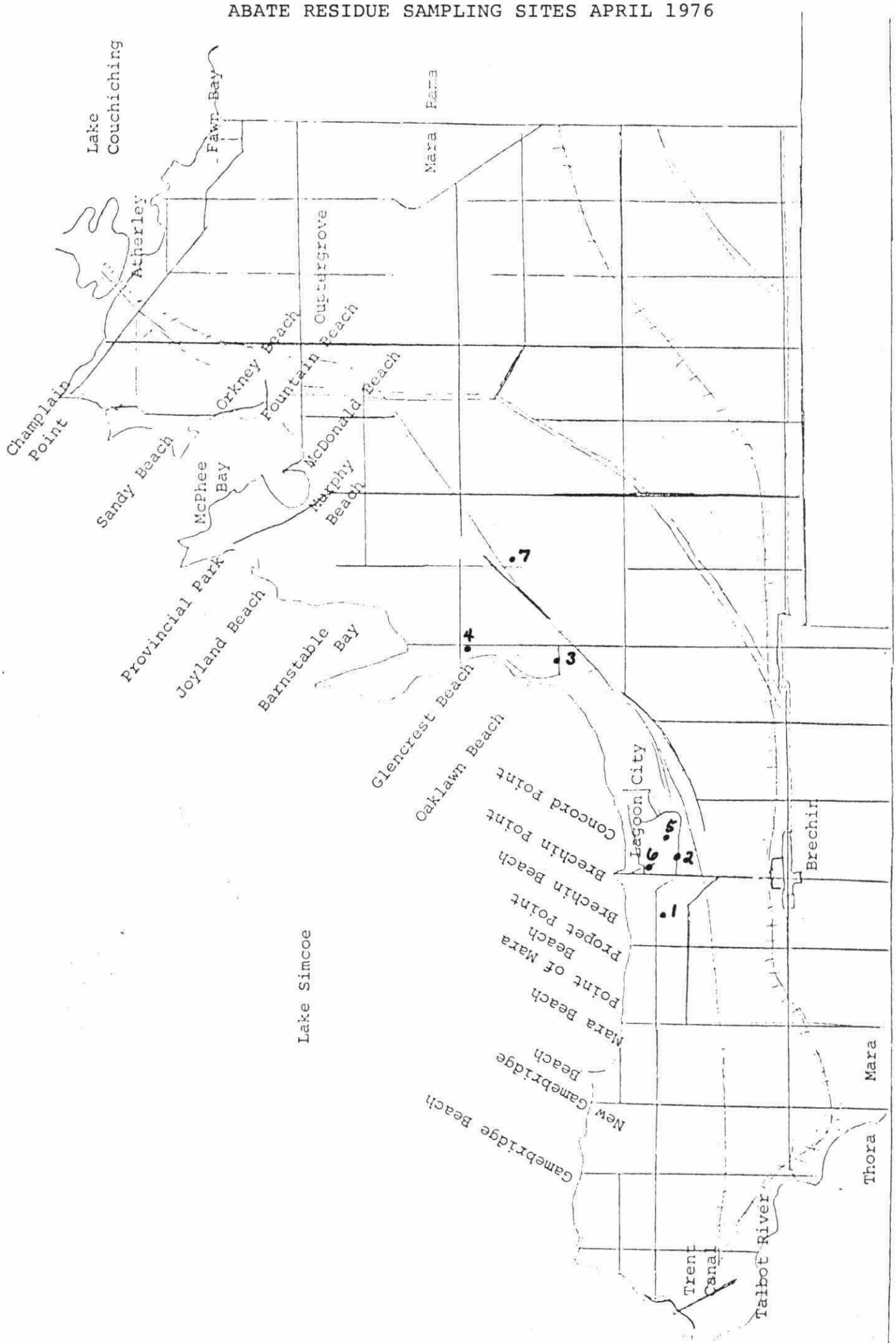


Table 1: Sampling Site Descriptions

	April 22	April 28 (Wed.)	April 29 (Thurs.)	May 4 (Tues.)
Site 1	-25-30 larvae/dip	-0.5/dip sparse distribution	-no larvae or pupae	-no larvae
Brechin Beach Road	-3rd instar	-all pupae		
	-water temp. 11.5°C	-	-water temp. 13.5°C	-water 12°C
	-mud & water sampled 7 P.M.	-observed 7.20 P.M.	-treated Sat. (Apr.24) granules still visible 10+/St^2	-sampled 1 P.M.
	-cold and overcast	-cloudy, overcast, cool 15-20 mph wind	-sunny, wind 15-20 mph	-air temp. 6°C 10 mph wind
Site 2				
Lagoon Parkway	-50 larvae/dip	-0-100/dip spotty distribution	-1-2/dip (some dead)	
	-2nd and 3rd instar	-3rd -4th instar	-4th instar	
	-water 13°C	-	-water 11.8°C	
	-mud and water sampled 6.20 P.M.	-observed 7 P.M.	-treated Sat. (Apr. 24)	
			-granules still visible	
Site 3				
Oaklawn/ Concession 7	-150-200/dip	-80-200/dip		-1/dip 1/3 time 1st instar
	-2nd & 3rd instar	3rd and 4th instar		-water 11°C
	-water 13°C	-		-sampled 11.55 P.M. treated Apr. 30-May 1
	-mud and water sampled 2.20 P.M.	-observed 7.45 P.M.		

Table 1: Sampling Site Descriptions (continued)

	April 22	April 28	April 29	May 4
Site 4				
Concession 7	-6 larvae/dip -2nd instar -water 13.5°C -mud and water sampled at 5.30 P.M.	-25-80/dip -3rd and 4th instar - -observed 8.20 P.M.		-33-40/dip -34d and 4th instar -water 10°C -sampled 2 P.M. treated Apr. 30 - May 1
Site 5				
Turtle Path Lagoon City	-35/dip -pupae and 4th instar -observed 1 P.M. not sampled			
Site 6				
Lake Avenue		-2-25/dip -4th instar -water 13°C -12-15 granules per sq. ft. -treated by hand Apr. 28: residues taken 24 hour post-treatment		-no larvae -sampled 1.20 P.M. -water 10°C
Site 7				
Muley Pt. Rd.		-8-10/dip -3rd and 4th instar -water 17°C -15-20 granules per sq. ft. -aerial treatment Apr. 29: residues taken 4 hour post-treatment		-no larvae -sampled 12.10 P.M. -water 10°C

Table 2: Abate Residues

Site (see figure 1)		April 22 Water	April 22 Sediment	April 29 Water	April 29 Sediment	May 4 Water	May 4 Sediment
1 Aerial treatment Apr. 24 (possibly hand treated Apr. 20-22)	a	ND	ND	ND	ND	ND	.12
	b	ND	ND	ND	ND	.001	.10
	c	ND	0.25	ND	ND	ND	.34
	d	ND	0.25	ND	ND	.001	.56
2 Aerial treatment Apr. 24	a	ND	ND	ND	ND		
	b	ND	0.09	ND	ND		
	c	ND	ND	ND	ND		
	d	ND	0.09	ND	ND		
3 Aerial treatment Apr. 30 - May 1 2nd treatment May 3	a	ND	0.18			ND	3.2
	b	ND	0.19			0.001	0.27
	c	ND	0.012			ND	1.9
	d	ND	0.38			0.001	5.4
4 Aerial treatment Apr. 30 - May 1	a	ND	.035			ND	ND
	b	ND	ND			Trace	0.19
	c	ND	ND			ND	ND
	d	ND	.035			Trace	0.19
6 Ground hand treated April 28	a			ND	4.1	ND	1.1
	b			ND	4.7	Trace	.29
	c			ND	4.0	ND	2.0
	d			ND	13.0	Trace	3.4
				24 hr. post treatment			
7 Aerial treatment April 29	a			ND	1.4	ND	1.5
	b			.004	.12	.001	.21
	c			ND	1.4	ND	2.0
	d			.004	2.9	.001	3.7
				4 hr. post treatment			

a = abate
b = abate sulfone
c = abate sulfoxide
d = total abate and metabolites

ND = non detectable

Residue Analysis and Discussion

1. Control samples of abate in mud and water at Sites 1, 2, 3 and 4 indicate some residual in the sediment although none in the water. What was found had apparently no hindrance on development of mosquito larvae. A problem of interpretation arises in that it is not known whether any of these sites were hand treated earlier in April/76 or whether this is a carry-over from 1975.

2. Comparing April 29th residue statistics from sites 6 (24 hr. post-treatment gound seeded) and 7 (4 hr. post-treatment aerial application) indicate that there is likely a larger factor of error towards high rates of larvicide being used through manually operated seeders than with aerial application. A comparison of visual granules per square foot must be used with caution because of the powdering phenomenon.

3. Comparing May 4th residue statistics from sites 3 and 4 with both treated by helicopter at the same time indicate that there is variation on the amount of larvicide actually reaching the largest pools because of overhead bush interference and drift problems in spite of a theoretical uniform application rate.

4. From ground truth studies, there is a wide variety in age class, rate of development and larvae numbers in each of the monitored sites. Since the aerial application was stretched over nine days because of weather interference, a general comment on the success of the treatment in 1976 over the 1975 treatment can not be made. It is obvious that timing of a larvicide treatment is equally as important as a selection of the rate of larvicide used.

5. Of the 11,800 pounds of Abate granular used, 1800 pounds was from 1975 stocks. 10,000 pounds of 1976 formulated Riddex Abate 2G from Kem-San was mixed with the old stock. The 1976 larvicide was formulated on a more dense clay granule which overcame the obvious problem of powdering in helicopter application of the 1975 material. However, the more compact clay carrier may be having some interference in the expected release of Abate larvicide off the granules and, if this rate of release is slower as suspected, larvae mortality may be affected.

6. Influence on the amount of organic matter in the pool breeding sites may also influence the distribution of the larvicide on food available to the larvae. It, therefore, may be necessary to go for an even higher rate of larvicide at those breeding sites where highly organic sediments exist so that lethal quantities of Abate are consumed by larvae within the short time period available before pesticide degradation.

Studies will be conducted in 1977 to determine which of these possible factors are actually influencing larvae mortality.

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